NEGATIVE MALE PARTNER INFLUENCES ON REPRODUCTIVE HEALTH AND CONTRACEPTIVE USE AMONG ADOLESCENT AND YOUNG ADULT WOMEN

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ABSTRACT

Intimate partner violence (IPV) and reproductive coercion (RC) are key public health concerns for young women and are associated with poor sexual health outcomes. We studied 1) the pathways between IPV/RC and unintended pregnancy and sexually transmitted infections (STI), 2) partner influence on use of female-controlled contraception (FCC), and 3) discordance between self-report and medical record data for pregnancy/STI and predictors of discordance. A cluster-randomized controlled trial of female family planning clinic patients (ARCHES; 16-24 years) and a nationally representative survey of women in the U.S. (NSFG survey; 15-24 years) were used. Women in the ARCHES study (n=2,363) self-reported IPV, RC, sexual self-efficacy, recent STI, past-year pregnancy, and past-year unintended pregnancy, at enrollment, four months, and twelve months; pregnancy and STI diagnoses were abstracted from medical records. Women in the NSFG survey (n=2,541) self-reported contraceptive use in the past year, whether they had stopped using a contraceptive method because a partner did not like it, and whether their partner wanted a baby but they themselves did not.

In the ARCHES sample, sexual self-efficacy mediated the relationship between IPV/RC and unintended pregnancy but not IPV/RC and STI. In the NSFG sample, current use of FCC was low, with the majority of those on FCC using oral contraceptives. Partner influence was

associated with greater current FCC use among young adults, but adolescents both with and without partner influence had poorer contraceptive use. Self-report on confidential surveys and medical record data showed poor agreement, with self-report providing higher prevalence estimates compared to medical records. Women who reported recent IPV or RC, were older, or African-American were more likely to self-report STI and pregnancies that were not in their medical records.

These findings have identified multiple pathways by which partner influence, including IPV and RC, impact young women's reproductive and sexual health, thus enabling future interventions to target these specific points. Further, best methodologies for this research field were identified. Thus, this dissertation has significant public health relevance as it informs programs to reduce disease burden due to sexual health sequelae associated with IPV/RC, and improve exposure and outcome ascertainment in future research.

TABLE OF CONTENTS

PREFACE xi

1. INTRODUCTION 1

1.1. BACKGROUND 1

1.2 RESEARCH AIMS 3

2. BACKGROUND AND SIGNIFICANCE 5

2.1. MALE PARTNER INFLUENCE ON FEMALES 5

2.2. MALE PARTNER INFLUENCES ON FEMALE REPRODUCTIVE AND SEXUAL HEALTH 9

2.2.1. Reproductive and sexual health outcomes 9

2.2.2. Mechanism of interest: contraceptive use and nonuse 19

2.3. METHODOLOGICAL LIMITATIONS OF CURRENT RESEARCH 27

2.4. THEORETICAL FRAMEWORK: SOCIAL COGNITIVE THEORY 31

2.5. CONCLUSIONS 37

3. ADDRESSING REPRODUCTIVE COERCION IN HEALTH SETTINGS STUDY 40

4. NATIONAL SURVEY OF FAMILY GROWTH 43

5. MANUSCRIPT 1: PARTNER VIOLENCE, CONDOM NEGOTIATION SELF-EFFICACY, AND SEXUAL HEALTH OUTCOMES AMONG ADOLESCENT AND YOUNG ADULT FEMALE FAMILY PLANNING CLIENTS: A MEDIATION ANALYSIS 44

5.1 ABSTRACT 45

5.2 BACKGROUND 47

5.3 METHODS 49

5.3.1 Study design and sample 49

5.3.2 Key measures 50

5.3.3 Analysis 51

5.4 RESULTS 52

5.4.1 Participant characteristics 52

5.4.2 Incident partner violence and reproductive/sexual health outcomes during follow-up 53

5.4.3 Mediation analysis 54

5.5 DISCUSSION 54

5.6 TABLES 58

6. MANUSCRIPT 2: MALE PARTNER INFLUENCE ON ADOLESCENT AND YOUNG ADULT CONTRACEPTIVE USE 61

6.1 ABSTRACT 62

6.2 BACKGROUND 64

6.3 METHODS 66

6.3.1 Study design and sample 66

6.3.2 Key measures 67

6.3.3 Analysis 68

6.4 RESULTS 69

6.4.1 Participant characteristics 69

6.4.2 Partner influence characteristics 70

6.4.3 Contraceptive use 70

6.4.4 Partner influence and contraceptive use 71

6.5 DISCUSSION 73

6.6 TABLES 77

7. MANUSCRIPT 3: CONCORDANCE OF SEXUAL HEALTH DATA BETWEEN SELF-REPORT AND MEDICAL RECORDS AMONG ADOLESCENT AND YOUNG ADULT WOMEN: THE ROLE OF PARTNER VIOLENCE AND RELATED FACTORS 83

7.1 ABSTRACT 84

7.2 BACKGROUND 85

7.3 METHODS 88

7.3.1 Study design and sample 88

7.3.2 Key measures 89

7.3.3 Analysis 91

7.4 RESULTS 92

7.5 DISCUSSION 94

7.6 TABLES AND FIGURES 100

8. SYNTHESIS 107

8.1 OVERVIEW OF RESEARCH FINDINGS 107

8.2 STRENGTHS AND LIMITATIONS OF THIS RESEARCH 110

8.3 PUBLIC HEALTH SIGNIFICANCE 111

8.4 DIRECTIONS FOR FUTURE RESEARCH 113

APPENDIX: KEY MEASURES FROM THE ADDRESSING REPRODUCTIVE COERCION IN HEALTH SETTINGS STUDY 115

BIBLIOGRAPHY 118

LIST OF TABLES

Table 1. Key studies on intimate partner violence, reproductive coercion, and unintended pregnancy 12
Table 2. Key and recent studies on the association between intimate partner violence and sexually transmitted infections in adolescent and young adult women 16
Table 3. Key studies on the association between intimate partner violence and condom nonuse in adolescent and young adult women 22
Table 4. Key studies on the association between intimate partner violence and non-condom contraceptive use 25
Table 5. Key studies on the association between intimate partner violence, sexual self-efficacy, and sexual health outcomes 35
Table 6. Participant characteristics at baseline (n=2,246) 58
Table 7. Key outcomes at 4- and 12-month follow-up phases 59
Table 8. Mediation analysis 60
Table 9. Participant characteristics 77
Table 10. Partner influence characteristics 79
Table 11. Most effective contraceptive women reported using twelve months prior to interview and month of interview 80
Table 12. Associations of male partner influence with contraceptive use 81
Table 13. Participant characteristics self-reported at baseline 100
Table 14. STI and pregnancy prevalence by data source and time point 101
Table 15. Associations with discordant reporting 102
Table 16. Multinomial logistic regression models to test the association between proposed predictors and STI / pregnancy reporting status 104

LIST OF FIGURES

Figure 1. Addressing Reproductive Coercion in Health Settings Flow Chart 42
Figure 2. Study flow diagram for analytic sample 106

PREFACE

This dissertation would not have been possible without the collaboration, expertise, and guidance of my committee. Each member brought his or her own insight and contributions, and for that I am incredibly grateful. I look forward to continuing to apply the knowledge I have gained during this process for years to come.

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1. INTRODUCTION

1.1. BACKGROUND

Dating, intimate, and sexual relationships have the potential for violence, coercion, and emotional abuse between partners. While perpetration and victimization is neither limited to one sex nor heterosexual relationships, the highest proportion occurs to women victimized by their male partners.[1] This negative partner influence is a high-burden public health problem, with one in four women experiencing intimate partner violence (IPV)[2] and 9% experiencing reproductive coercion (RC; attempts to control pregnancy and pregnancy outcomes of female partners)[3,4] in their lifetimes. Adolescent and young adult women are at particular risk for victimization and long-term health consequences.[5,6]

Evidence indicates that IPV and RC are related to poor reproductive and sexual health outcomes,[7,8] drawing increased attention on the influence that males may have on their female partners' reproductive health and contraceptive use. The focus of this project is to further the current understanding of how these processes occur. To accomplish this, possible mediators on the pathway between IPV/RC and poor reproductive health outcomes will be assessed, female contraceptive habits in the context of male partner influence will be characterized, and best methods for this area of research while considering sources of bias will be assessed.

The Addressing Reproductive Coercion in Health Settings (ARCHES) Study (PIs: Miller and Silverman; NIH grant # R01HD064407) is a cluster randomized controlled trial (RCT) to test the effectiveness of a clinician-delivered brief intervention on IPV and RC during routine clinical visits compared to standard of care in twenty four family planning clinics in Western Pennsylvania. The goal of the intervention is universal education and reducing risks of IPV, RC, and unintended pregnancies. Women ages 16-29 years receiving care at the 24 participating family planning clinics for any reason, speak English or Spanish, and able to give consent were eligible to participate. A total of 3,687 women agreed to participate. Women completed surveys at baseline, at a four month follow-up (T2), and a twelve month follow-up (T3). These surveys assessed demographics, recent and lifetime experiences of IPV, recent RC, self-efficacy (general, condom negotiation, use of harm reduction behaviors), recognition of sexual and reproductive coercion, lifetime and recent history of pregnancy, unintended pregnancy, and abortions, and for baseline only, future pregnancy intention. Almost all women (97%) granted us access to a total of 30 months of their medical record data at those clinics (one year pre-enrollment through eighteen months post-enrollment).

The National Survey of Family Growth (NSFG) is a nationally representative survey of men and women 15-44 years of age.[9] It is conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics. The purpose of the survey is to create nationally representative estimates for pregnancy and pregnancy risk, medical care associated with pregnancy, factors affecting household structure (e.g., marriage, divorce), adoption, father involvement behaviors, and attitudes about marriage, childbearing, and sex. The latest cycle was conducted in 2006-2010 among 12,279 women and 10,403 men. Information self-reported by

women included detailed contraceptive use histories for up to the past four years, reasons for discontinuation of contraception, condom use frequency, and pregnancy history.

Taken together, the ARCHES study and the NSFG are two sources of data rich in information on young women's reproductive and sexual health. Advantages to the ARCHES study are the multiple assessments of IPV and RC over a one year period, use of a family planning clinic population that has higher rates of IPV and RC compared to the general population,[7,10,11] and both self-reported and medical record data on sexual and reproductive health outcomes (unintended pregnancy, STI). The NSFG, on the other hand, is a nationally representative survey that includes a greater diversity compared to ARCHES and has extensive data on contraceptive use over a substantial period of time (3-4 years). Together, these data will allow for two differing approaches to understanding partner influence on women's reproductive and sexual health.

1.2 RESEARCH AIMS

1) To assess the relationship between negative male partner influence, condom use self-efficacy, and sexual health outcomes among adolescent and young adult female clients of family planning clinics. *We hypothesize that 1) adolescent women (16-19 years) will have lower levels of condom negotiation self-efficacy compared to young adult women (20-24 years, 2) women (16-19 and 20-24 years) reporting recent experiences of intimate partner violence or reproductive coercion will have lower condom negotiation self-efficacy and worse sexual health outcomes, and 3) condom negotiation self-efficacy will*

mediate the association between intimate partner violence/reproductive coercion and poor sexual health outcomes among both age groups over a one year period.

2) To identify differences in contraceptive use by negative partner influence over a 12 month period in a nationally representative sample of women 15-24 years. *We hypothesize that women who report partner influence will have 1) less current use of female-controlled contraceptives (FCC); 2) more months of FCC nonuse; 3) more changes in FCC; and 4) more FCC discontinuation in a one year period compared to those who have not reported partner influence.*

3) To assess concordance between self-report and medical record data for pregnancy and STI, how IPV/RC influence pregnancy and STI reporting, and how pregnancy intention influences reporting in adolescent and young adult female clients of family planning clinics. *We hypothesize that 1) fewer cases of and pregnancy and STI will be recorded through self-report compared to medical record data; 2) those who experienced recent IPV or RC will have greater discordance in STI and pregnancy reporting; and 3) those with who did not plan to become pregnant in the next year will have greater discordance in STI and pregnancy reporting.*

2. BACKGROUND AND SIGNIFICANCE

2.1. MALE PARTNER INFLUENCE ON FEMALES

There is increasing focus on the influence males have on their female partners. While much of this influence can be positive and supportive, a substantial proportion of males commit violence against women, including their female partners and ex-partners. For the purposes of this study, negative male partner influence is conceptualized as violence and coercion within dating and intimate relationships. The two key aspects to be covered in this project are intimate partner violence (IPV) and reproductive coercion (RC) (i.e., male attempts to impregnate a female against her wishes and to control the outcomes of a pregnancy).

IPV – also referred to as domestic violence, domestic abuse, or, when occurring among teens and young adults, adolescent relationship abuse – includes physical or sexual violence or threats of violence, psychological and emotional abuse, and stalking by a person who is or was an intimate partner to the victim. Often victims experience multiple forms of abuse, such as physical and psychological abuse concurrently.[4,12] In a sample of family planning clinic patients (ages 16-29), 35% of women who reported partner physical or sexual IPV also reported reproductive coercion, compared to 15% of women reporting RC in the absence of IPV.[7]

Lifetime experience of physical violence, rape, and/or stalking at the hands of an intimate partner occurs in approximately 1 in 3 women (36%) in the United States[4]; almost half of all

women (48%) experience psychological aggression by intimate partners at some point in their lifetimes and 14% in the past 12 months.[4] An estimated 10.3 million women (9%) will experience sexual or reproductive coercion (e.g., trying to get them pregnant when they did not want to be or refusing to wear a condom) in their lifetimes.[4] Among high risk populations (e.g., family planning clinic patients), lifetime RC estimates reach 26%.[7]

Adolescents and young adult women are at considerable risk for victimization at the hands of their partners. Most victims (69%) of physical violence, rape, or stalking experienced IPV for the first time before reaching 25 years of age.[4] Among 12-18 year olds, 31% of females had experienced psychological abuse, physical abuse, or both at the hands of a dating partner.[13] Rates are substantially higher among vulnerable populations; one study found that 45% of the 16-20 year old patients of adolescent health clinics had been physically or sexually abused by an intimate partner.[14]

The negative influence of males on their female partners' health through IPV has been an area of considerable research, mostly in adult women samples. Among adolescents, IPV is associated with depressive episodes, post-traumatic stress disorder,[15] substance use, unhealthy weight control behaviors, suicidality,[6] foregoing care in the past year, and having lower self-rated health.[8] Ever experiencing IPV (by grades 7-11) has longitudinally been associated with future (≥5 years) poorer self-rated health ,[16] greater depressive symptoms,[13,16,17] suicidal ideation[12,13] and attempts,[12] smoking,[13,17] marijuana use,[17] and recent low health-related quality of life.[13]

One of the greatest concerns when IPV occurs in adolescent relationships is a continuing pattern of victimization into adulthood. Strong evidence for this comes from the National Longitudinal Study of Adolescent Health (Add Health) in the U.S. Add Health assessed a

nationally representative sample of adolescents (grades 7-12 at baseline) for health behaviors and risk factors at three time points: Wave 1 (1994-1995), Wave 2 (1996), and Wave 3 (2001-2002; ages 18-25 years).[13] Experiencing physical IPV as a young adult was three times as likely among those who experienced dating violence five years earlier (adjusted OR=2.8, 95% CI 2.1-3.8).[13] Among these IPV victims at Wave 3, almost 1 in 5 (18%) reported adolescent-young adult persistent victimization.[18]

In addition to the negative sequelae associated with IPV, there is mounting evidence that some men force or influence contraceptive nonuse in an effort to exert reproductive control over their female partners. This phenomenon has been described as "reproductive coercion" (RC)[3,7] and is estimated to impact 9% of the adult US female population.[4] RC is characterized by male partners' attempts to control pregnancy and outcomes of pregnancy through birth control sabotage and coercion. This can include pressure to become pregnant, such as telling a partner not to use any birth control or threatening to leave her if she does not become pregnant. Birth control sabotage involves more overt actions, such as taking off the condom during sex in order to impregnate the woman and taking away or preventing a woman from accessing contraception. Post-conception, men may try to control the outcome of the pregnancy, including trying to prevent a woman from getting an abortion that she wants or trying to force her to get an abortion when she wants to keep the pregnancy. Not only do these actions drastically increase risk for unintended pregnancy,[7,11] but as condom nonuse is a strong component of RC, women's risk of STI infection may be increased as well. The American College of Obstetricians and Gynecologists (ACOG) currently recommends regularly screening all reproductive-aged women for RC and offering specific harm-reduction strategies, such as hidden contraceptive options.[19]

Recent research has confirmed the occurrence of RC and its association with IPV. Among female clients of family planning clinics (ages 16-29 years in both studies), 25% had ever experienced reproductive coercion[7] and 5% had experienced it in the past 3 months.[11] Prevalence estimates differed by IPV status, with 35% of IPV victims reporting lifetime RC compared to 15% in non-IPV victims.[7] Similarly, 32% of women ages 18-44 years who had ever experienced RC also reported IPV within that relationship.[20] IPV documented in medical record data is associated with more frequent contraception method changing among family planning clinic users.[21] This indicates that there is significant overlap among the types of violence males perpetrate on their female partners, resulting in the potential for serious poor sexual and reproductive health outcomes.

At this time, it is unclear how extensively ACOG's recommendation to universally screen adolescent and adult women for IPV and RC has been implemented in daily clinical practice. Despite a longstanding recommendation to screen for domestic violence[22,23] and its acceptability by female patients,[24-26] reports indicate that screening and documenting are not implemented well in clinical settings.[27] Similar limitations would be expected with RC as a sensitive topic but has not been examined to date.

Patterns of contraceptive use by women who are experiencing male partner control over their reproductive and sexual decision making are not well elucidated in the current literature. Why some women are able to cope with RC by surreptitiously using female-controlled contraception or ending relationships while other women experience unintended pregnancies and other negative outcomes remains an important question. Additionally, identifying factors that are associated with better or worse outcomes for women experiencing IPV and RC is needed to guide interventions that may reduce the risk for poor health outcomes in the context of IPV/RC.

2.2. MALE PARTNER INFLUENCES ON FEMALE REPRODUCTIVE AND SEXUAL HEALTH

2.2.1. Reproductive and sexual health outcomes

Reproductive and sexual health outcomes have received special attention in the IPV literature, as pregnancy is a time when women may be particularly vulnerable to increasing abuse with poor outcomes for women and infants. Estimates of IPV during pregnancy in adult women range from 4% to 15%,[28,29] with rates as high as 29% in pregnant teenagers.[30] Almost half of women who experience IPV during pregnancy report that the frequency of violence increased during the perinatal time period.[29]

Evidence indicates that experiencing IPV before or during pregnancy is associated with poor perinatal and post-partum outcomes; these associations persist after controlling for other risk factors, such as delayed prenatal care and alcohol/tobacco use during pregnancy. Silverman and colleagues (2006) found that, compared to new mothers with no past-year physical IPV, new mothers who had experienced IPV both before and during pregnancy or during pregnancy only were less likely to receive early (first trimester) prenatal care and were more likely to smoke during the third trimester.[28] Controlling for these risk factors, women who were abused during pregnancy only or both prior to pregnancy and during were still more likely to have preterm labor, vaginal bleeding, kidney infection/UTI, ER visit or hospitalization prior to delivery, and low birth weight babies, compared to women who did not experience physical IPV.[28] Specific to adolescents, previous abuse was associated with previous miscarriages and infant birth weight among 18-19 year olds.[31] Subsequent work has generally supported these associations.[32]

Past experiences of IPV can result in poor pregnancy-related outcomes even in the absence of prenatal IPV. In the study by Silverman, women with a lifetime history of physical

IPV (excluding the prenatal period) were significantly more likely to have a history of pregnancy loss.[33] Women who experienced IPV in the year prior to pregnancy but not during pregnancy had increased risks of preterm labor, diabetes, kidney infection/UTI, premature rupture of membranes, preterm delivery, low birth weight, and infant needing ICU care at birth compared to never-abused women after adjusting for relevant confounders such as race, smoking, and age.[28] These women were also less likely to receive early (first trimester) prenatal care and more likely to smoke and use alcohol during the third trimester. These risk behaviors were controlled for in the final models that assessed reproductive health outcomes of physical IPV prior to pregnancy to tease apart the effects of IPV and associated risk behaviors during pregnancy, indicating that IPV independently contributes to these poor reproductive health effects.[28] Overall, the reproductive health effects of IPV are long-lasting and not just the result of physical harm during pregnancy.

Among the myriad reproductive and sexual health consequences of IPV/RC, the focus of this project is *unintended pregnancies* and *sexually transmitted infections (STIs).*

Unintended pregnancies. Unintended pregnancies are common in the United States, accounting for 37% of all births in 2006-2010.[34] Younger women bear the greatest burden of unintended births, with 77% of births to 15-19 year olds and 50% of births to 20-24 year olds.[34] Considering all pregnancies regardless of outcome (i.e., live birth or not), the proportion of unintended pregnancy reaches 51%.[35] Disparities exist by race/ethnicity, income level, and education, such that unintended pregnancies are more common among racial and ethnic minorities and those with low income and educational attainment.[36]

IPV is strongly associated with unintended pregnancies.[37,38] Among live births, a significantly higher proportion of women who experienced physical abuse during pregnancy

reported that their pregnancies were unintended, including pregnancies being unwanted (9.9%) or earlier than desired (6.9%), compared to intended pregnancies (3.1%).[39] There is also evidence that IPV is linked to unintended pregnancies specifically among adolescent women. Adolescent pregnancies are largely unintended,[34] and ever experiencing dating violence is associated with higher odds of pregnancy during this developmental period.[6,12,40]

The past few years have shown an increased interest in the overlap between IPV, RC, and unintended pregnancy, with evidence indicating significant associations (see Table 1 for key studies).[7,11] Odds of reporting a past unintended pregnancy were significantly higher when reporting RC, IPV, or both.[7,11] Women with a history of IPV report greater difficulty from partners in obtaining and using contraception[41]; not surprisingly, each additional pregnancy these women experience is associated with higher odds of having experienced IPV.[41] Examining the associations between contraceptive use factors and IPV illustrate the pathways by which negative male partner influence can lead to unintended pregnancies, including partners making it difficult for the woman to use birth control or wanting to get them pregnant. This work begins to establish temporality, heretofore only suggested in qualitative interviews, between partners' control over reproductive and contraceptive behaviors and contraceptive nonuse.

Table 1. Key studies on intimate partner violence, reproductive coercion, and unintended pregnancy

Author (Year)	Population and sample size	Measures	Results	Comments
Miller (2010)[7]	Female family planning clinic patients 16-29 years, based survey as part of a pilot IPV/RC intervention (n=1278)	**Reproductive coercion** 'Has someone you were dating or going out with ever… 1) told you not to use any birth control (like the pill, shot, ring, etc.)?; 2) said he would leave you if you didn't get pregnant?; 3) told you he would have a baby with someone else if you didn't get pregnant?; 4) hurt you physically because you did not agree to get pregnant?; and 5) tried to force or pressure you to become pregnant? 6) taken off the condom while you were having sex so that you would get pregnant?; 7) put holes in the condom so you would get pregnant?; 8) broken a condom on purpose while you were having sex so you would get pregnant?; 9) taken your birth control (like pills) away from you or kept you from going to the clinic to get birth control so that you would get pregnant?; 10) made you have sex without a condom so you would get pregnant? "Have you ever hidden birth control from a sexual partner because you were afraid he'd get upset with you for using it?" **Lifetime physical/sexual IPV** 'Has someone you were dating or going out with ever… 1) hit, pushed, slapped, choked or otherwise physically hurt [you], 2) insisted (without using force or threats) on having sex (vaginal, oral, or anal sex) with you when you didn't want to? 3) used threats to make you have sex (vaginal, oral, or anal sex) with them?, and 4) used force (hitting, holding down, using a weapon) to make you have sex (vaginal, oral, or anal sex) with them?' **Sexual health behaviors/outcomes** Unintended pregnancy ('How many times have you been pregnant when you didn't want to be?')	• 53% lifetime IPV • 19% pregnancy coercion • 15% birth control sabotage • 41% history of unintended pregnancy **Models predicting UIP by RC and IPV AOR(95% CI)** **Reproductive coercion (RC)** • RC only: 1.01 (0.62-1.63) IPV only: 1.11 (0.84-1.46) • Both: 1.99 (1.11-3.58) **Pregnancy coercion (PC)** • PC only: 1.05 (0.60-0.88) • IPV only: 1.14 (0.88-1.83) • Both: 2.22 (1.14-4.32) **Birth control sabotage (BCS)** • BCS only: 1.11 (0.56-2.19) • IPV only: 1.26 (0.97-1.62) • Both: 1.60 (0.73-3.48) **Stratified by violence** • RC, PC, and BCS unassociated with UIP among those not having experienced IPV • RC, PC, and BCS all significantly associated with UIP among those who experienced IPV	• High risk population • Doesn't assess emotional/psychological abuse • Temporality: cross-sectional data only on lifetime experiences • Models adjusted for age, clinic site, race/ethnicity, and nativity
Miller (2014)[11]	Female family planning clinic patients 16-29 years, based survey as part of	**Recent reproductive coercion** 10 items measuring reproductive coercion in the past 3 months; see Appendix **Lifetime physical/sexual IPV** Three items measuring lifetime physical and sexual IPV;	• 46% history of IPV • 5% RC • 12% past-year UIP **Associations with UIP** **AOR (95% CI)**	• Temporality: lifetime assessment of IPV, past-year UIP, recent RC (is recent RC a proxy for RC experiences at time

Table 1 Continued

	an IPV/RC intervention (n=3539)	see Appendix **Past-year unintended pregnancy** Seven items from the NSFG, modeled as a summary score; see Appendix	• Yes IPV / yes RC: 2.00 (1.15-3.48) • Yes IPV / no RC: 1.80 (1.42-2.26) • No IPV / yes RC: 1.79 (1.06-2.03)	of conception?) • High-risk population • Doesn't assess emotional abuse
Gee (2009)[41]	Female patients at Planned Parenthood in Philadelphia, ≥18 years (n=1354)	**Lifetime physical/sexual IPV** "Has an intimate partner ever… 1) threatened physical violence, 2) attempted physical violence, 3) committed physical violence, 4) had unwanted sex by a current or former partner, 5) past-year injuries to physical violence or unwanted sex **Sexual health behaviors** condom and other contraceptive use factors/barriers associated with contraceptive non-use	• 21% reported IPV • IPV not associated with using a condom (49% vs 46%, p=0.35) or type of contraceptive used recently (p=0.33) **Associations with IPV** **AOR (95%CI)** • Not using birth control because 'partner didn't feel like using it or wanted you to get pregnant': 2.34 (1.41-3.89) • Agreeing that 'my partner makes it difficult to use birth control': 12.78 (1.68-4.63) • Agreeing that 'skipped using birth control because can't afford it': 2.02 (1.68-4.63) • Going without birth control in the past 4 months: 1.16(0.81-1.66)	• Temporality: lifetime assessment of IPV, but contraceptive use unclear on timing (some past 4 months, some 'recently,' etc.) • High-risk population • Doesn't assess emotional abuse

IPV, intimate partner violence; RC, reproductive coercion; UIP, unintended pregnancy; PC; pregnancy coercion; BCS, birth control sabotage; AOR, adjusted odds ratio

IPV has been associated with unintended pregnancies across populations, suggesting that women victimized in their relationships have less power to decide upon and use effective contraception.[42,43] The majority of work at this time is cross-sectional, thus studies are needed to establish temporal trends. As not all women in abusive relationships have unintended pregnancies, protective factors should be identified for future preventive efforts.

Sexually Transmitted Infections (STIs). STIs are a major public health concern, as one in four adolescent girls is infected[44] and adolescents and young adults between the ages of 15 and 24 represent half of new STI cases.[45] In addition to the short-term consequences of untreated STIs, including symptoms and increased susceptibility to HIV infection, STIs increase reproductive health morbidity. Chlamydia and gonorrhea are associated with pelvic inflammatory disease (PID).[46] PID, in turn, is associated with poor reproductive health outcomes, including infertility, chronic pelvic pain, recurrent PID, and ectopic pregnancy.[46]

Much of the evidence to date supports a positive association between IPV and risk of STIs; key and recent studies are presented in Table 2. Lifetime exposure to physical/sexual or physical only IPV has been associated in females with a history of STIs,[47-49] being afraid to notify a partner of an STI,[50] being less likely to seek STI treatment or testing,[50] having faster time-to-STI incidence,[51] and testing positive for a current STI[48]; lifetime, but not current, physical/sexual IPV was associated with testing positive for an STI in one study.[49] Experiencing sexual IPV only has been associated with decreased odds of testing positive for an STI at a single time point, likely due to increased prior care-seeking for testing (and therefore treatment)[48]; this is supported by a higher proportion of these women self-reporting an STI diagnosis in the past year.[48] This differential risk by type of IPV, specifically presence or absence of sexual IPV, is also supported by a study that found that lifetime and current physical/verbal IPV was not

associated with a self-reported history of STI,[52] suggesting that when measures of IPV do not include sexual abuse occurring in such relationships, the STI risk may be underestimated.

Studies of male perpetrators of IPV support an association between IPV and STIs. Among 14-20 year old heterosexually active male clients of adolescent health clinics, perpetrating teen dating violence was associated with a self-reported history of STI compared to never-perpetrators.[53]

Many studies to date rely on either self-report or one-time specimen testing for current infections, possibly leading to biases by exposure, especially for those who are asymptomatic and may not have sought an STI test (self-report) and miss infections that had been previously diagnosed and treated or cleared on their own (specimen testing). As women who experience IPV exhibit greater healthcare seeking[54,55] and are over-represented in family planning and STI clinics,[8,10,47,56] STI tests at one point in time could result in bias. Findings would underestimate risk if more frequent STI testing and treatment decreased prevalence among women exposed to IPV compared to those who did not experience IPV (e.g., incidence may be higher, but shorter duration could decrease prevalence). Studies are needed that substantiate self-report with longitudinal medical record data and explore possible biases.

STIs represent a common and serious outcome of IPV, but current research is limited by methodological inconsistencies across studies. The mechanisms by which women may be exposed, such as being afraid to request condom use or being pressured not to use condoms as a sign of “loyalty” or “love,” are also not well understood. Addressing the role of partner influence on STI acquisition is needed to identify potential mechanisms and intervention strategies to reduce the risk for STI acquisition and reinfection.

Table 2. Key and recent studies on the association between intimate partner violence and sexually transmitted infections in adolescent and young adult women

Author (Year)	Population and sample size	Measures	Results	Comments
Decker (2005)[47]	Sexually active females in the Massachusetts Youth Risk Behavior Survey, grades 9th-12th, years 1999 and 2001 (n=1641)	**Lifetime physical/sexual IPV** "Have you ever been hurt physically or sexually by a date or someone you were going out with? This would include being hurt by being shoved, slapped, hit, or forced into any sexual activity." (no, physical only, sexual only, both) **Sexual risk behaviors/outcomes** Ever HIV/STI tested, ever diagnosed with STI/HIV	• 31.5% any physical or sexual IPV • 32.9% ever testing for STIs/HJIV • 4.7% STI diagnosis **Odds of testing for STIs only** • Sexual only: 1.38 (0.58-3.29) • Physical only: 1.63 (1.02-2.62) • Both: 2.41 (1.38-4.22) **HIV testing only** • Sexual only: 1.17 (0.31-4.38) • Physical only: 1.14 (0.44-2.91) • Both: 1.28 (0.43-3.76) **Both STIs/HIV** • Sexual only: 1.93 (1.02-3.63) • Physical only: 1.11 (0.73-1.68) • Both: 3.00 (1.93-4.66) **STI/HIV diagnosis** • Sexual only: 1.96 (0.77-4.97) • Physical only: 2.18 (1.13-4.21) • Both: 2.59 (1.05-6.35)	• Adjusted for age, race, condom use at last intercourse, 2+ partners in last 3months • Sexual violence only is not associated with HIV/STI testing or diagnosis • Physical only or physical/sexual IPV associated with testing and diagnosis (stronger associated for physical/sexual)
Decker (2011)[50]	Sexually active female family planning clinic patients in California , ages 16-29 (n=1282)	**Lifetime physical/sexual IPV** (see Miller et al. 2010 in Table 1) **Sexual health behaviors and outcomes: partner STI notification** Fear of partner notification, history of partner notification, partner response to partner notification ('when you told a sexual partner you got an STD from them, did they . . . seek treatment or testing?', 'tell you it wasn't from them or accuse you of cheating?', 'threaten to hurt you physically or actually hurt you physically?'	• 53.3% reported physical/sexual IPV **IPV associated with (ARR (95% CI))** • **Fear of partner notification: 1.46 (1.20-1.77)** • Notified partner: 0.99 (0.93-1.05) **Partner response to notification** • **Partner sought treatment: 0.93 (0.86-0.99)** • **Said not from them or accused of cheating: 1.56 (1.24-1.98)** • Threatened to harm or did harm: 1.17 (0.51-2.67)	• Cross-sectional • Adjusted for age, race/ethnicity, and recruitment site • Higher risk population
Hess	Female	**Past-year physical and sexual IPV**	• 7.1% prevalent STI	• Original Wave I data were

Table 2 Continued

(2012)[48]	participants in the Add Health Study, Wave III, who were sexually active in heterosexual relationships in past three months and consented to STI testing, 18-28 years old (n=3,548)	Physical IPV: perpetrator-only, victim-only, reciprocal, nonabusive Sexual IPV: victim-only **Sexual health behaviors and outcomes** Positive STI result (*C. trachomatis, N. gonorrhoeae*, and *T. vaginalis*); condom use at last intercourse	• 31.8% used condom at last intercourse **IPV status** • 17% reciprocal abuse • 3% victim-only • 12% perpetrator-only • 8% sexual victimization **Prevalent STI** • Reciprocal: 0.5 (0.63-1.43) • **Victim-only: 2.06 (1.01-4.21)** • Perp-only: 1.26 (0.84-1.88) • **Sexual victim: 0.48 (0.26-0.87)** • Condom use last intercourse: 1.00 (0.73-1.36) • # past-year sex partners: 1.06 (0.99-1.13) **Condom used last intercourse** • **Reciprocal: 0.79 (0.62-0.99)** • **Victim-only: 0.58 (0.34-0.97)** • Perp-only: 0.90 (0.71-1.15) • Sexual victim: 0.91 (0.68-1.23) • # PY sex partners: 0.94 (0.88-1.00)	representative of 7th-12th grade students • Restricted subsample more • Only looks at most recent "important" relationship • IPV estimates low given the literature • Adjusted for physical IPV, sexual IPV, race/ethnicity, age, education, level of commitment, age discordance, partner has concurrent partners, condom use at last vaginal intercourse, and past-year drug use, heavy drinking, sex trade for money, # of sex partners • temporality
Reed (2014)[53]	Cross-sectional survey of males at adolescent health clinics in Boston who ever reported heterosexual sex, 14-20 years old (n=134)	**IPV perpetration** Physical, sexual, and psychological violence **Sexual health behaviors and outcomes** Ever diagnosed with an STI, consistent condom use in past three months ('always' = consistent)	• 14.9% history of STI • 35.8% consistent condom use past 3 months **IPV perpetration AOR (95% CI)** • **History of STI: 3.3 (1.2-9.2)** • Consistent condom use: 0.8 (0.4-1.6)	• IPV perpetration associated with STIs but not consistent condom use • Models adjusted for living situation (no other significant demographics)
Roberts, Auinger, & Klein (2005)[52]	Sexually active, dating females in the Add Health study, ages 13-22 years (n=973)	**Verbal/physical IPV** Past verbal abuse, physical abuse, current verbal abuse, current physical abuse **Reproductive health outcomes** No condom or contraception use at most recent intercourse, history of STI or pregnancy	• 13% current verbal abuse • 6% current physical abuse • 23% past 18 month verbal abuse • 15% past physical abuse • 48% condom nonuse at last intercourse **Logistic regression model results AOR(95% CI)** **Any history of STIs** • Past verbal: 1.47 (0.81-2.70)	• Sexual IPV not captured • Contraception measure included condoms as well (as opposed to female-controlled methods only) • Adjusted for history of sexual coercion • Specific to adolescents • Nationally representative of

Table 2 Continued

			• Past physical: 1.61 (0.86-3.03) • Current verbal: 0.90 (0.39-2.04) • Current physical: 1.37 (0.58-3.23) **Any history of pregnancy** • Past verbal: 1.43 (0.86-2.33) • Past physical: 2.27 (1.35-3.85) • Current verbal: 1.37 (0.77-2.44) • Current physical: 3.33 (1.72-6.25)	those in school at Wave I • Cross-sectional

2.2.2. Mechanism of interest: contraceptive use and nonuse

A major contributing factor to unintended pregnancies and STIs is condom and contraceptive nonuse. When possible, condom nonuse is considered separately from other contraceptive use, as condom use specifically refers to a male partner using a condom (not the use of female condoms). In examining male partner influences on reproductive and sexual health outcomes, it is critical to distinguish between contraception that involves male behavior (condom was or was not used) and female behaviors (access to and use of hormonal contraceptive methods) as the pathways for male partner influence are likely to be different.

At a national level, contraceptive nonuse is common; 18.7% of 15-19 year olds and 14.3% of 20-24 year olds considered 'at risk for pregnancy' report not currently using any contraceptive method .[57,58] These proportions are higher than in any other age groups. Roughly half of adolescent and young adult women identified as 'at risk for pregnancy' use oral contraceptives ('the pill') as their most effective method of contraception (54% and 48% among 15-19 and 20-24 year olds).[57,58] Almost one in four sexually active 15-19 and 20-24 year olds report using condoms as the primary pregnancy prevention method (22.8% and 24.5%, respectively).[57,58] Intrauterine devices (IUDs), which are a highly effective, long-acting reversible contraceptive option, are not well utilized in these populations (3.6% and 5.9%, respectively).[57,58] Among high school students, there was an overall increase in condom and other contraceptive usage between 1991 and 2007, but the greatest increase occurs between 1991 and 2003 before plateauing from 2004 to 2007.[59]

A compounding problem with contraceptive nonuse is that once a female tries a given method, chances of discontinuation are high. Of the women who tried any contraceptive method, 30% stopped using oral contraceptives, 11% stopped using condoms, 43% stopped using a

hormonal contraceptive injection, and 50% stopped using a hormonal contraceptive dermal patch.[58]

Past discontinuation or nonuse of contraception is a strong predictor of future nonuse. Condom use during adolescence is associated with condom use six months[60] and five years later.[61] Greater partner sexual communication was associated with decreased odds of inconsistent contraceptive use,[60] suggesting that more positive relationships around sex are protective against risky behaviors. Also of note, a positive STI history was not associated with inconsistent contraceptive use.[60] While a decreased odds of inconsistent use following an STI would suggest that adolescents change behaviors following adverse outcomes (e.g., infection), this null finding indicates that condom use behavior is hard to change, even when given motivating factors such as past STIs.

Condoms serve a dual purpose, protecting against both pregnancies and STIs. Unlike other forms of contraception, condom usage requires knowledge and cooperation from male partners. Women who experience IPV, RC, or other forms of abuse within dating relationships may be at a greater disadvantage to negotiate condom use, risking both perceived and actual consequences to requests.

Adult women who report IPV are more likely to also report less frequent condom use[43,62] and to request condom use less frequently[62] compared to non-abused women. Results among adolescents and young adult women are less conclusive; key studies are presented in Table 3. Current verbal abuse[52] is associated with condom nonuse while past[52] or lifetime[61] verbal is not. Past or lifetime physical IPV is associated with condom use in some[6] but not all[52,61] studies; similarly, current physical IPV is a significant predictor in some samples[61] but not all.[52] Lifetime sexual IPV or forced sex is not associated with condom nonuse[6,61] but combined physical IPV

and sexual IPV/forced sex are associated in the same studies.[6,61] Inconsistencies across studies examining IPV and condom use may be the result of study design differences and differences in abuse measures.

Research with men supports an association between IPV and contraceptive nonuse. One study asked heterosexual men to report past-year physical violence and past-month condom usage. After controlling for possible confounders (condom use self-efficacy and outcome expectancies, participant age, partner pregnancy desire, and HIV status), men who perpetrated moderate to severe violence against their female partners were half as likely to report using condoms consistently compared to those who did not perpetrate moderate or severe IPV (OR=0.49, 95% CI 0.27-0.86).[63]

Women experiencing IPV have an impaired ability to negotiate condom use. Young women who experience IPV report greater fear of requesting condom use,[14,40,43] experiencing violence, threats of violence, and other negative consequences from requesting condom use,[14,64] and being coerced into not using a condom during sex.[14] Not surprisingly, these women are also less likely to use condoms consistently.[40,65]

Table 3. Key studies on the association between intimate partner violence and condom nonuse in adolescent and young adult women

Author (Year)	Population and sample size	Measures	Results	Comments
Roberts, Auinger, & Klein (2005)[52]	Sexually active, dating females in the Add Health study, ages 13-22 years (n=973)	**Verbal/physical IPV** Past verbal abuse, physical abuse, current verbal abuse, current physical abuse **Reproductive health outcomes** No condom or contraception use at most recent intercourse, history of STI or pregnancy	• 13% current verbal abuse • 6% current physical abuse • 23% past 18 month verbal abuse • 15% past physical abuse • 48% condom nonuse at last intercourse **Logistic regression model results AOR(95% CI)** **Condom nonuse** • Past verbal: 1.24 (0.86-1.77) • Past physical: 0.87 (0.57-1.33) • **Current verbal: 1.56 (1.02-2.40)** • Current physical: 1.42 (0.79-2.55)	• Sexual IPV not captured • Contraception measure included condoms as well (as opposed to female-controlled methods only) • Adjusted for history of sexual coercion • Specific to adolescents • Nationally representative of those in school • Cross-sectional
Silverman et al. (2001)[6]	Female 9th-12th grade students who participated in the Massachusetts Youth Risk Behavior Survey in 1997 and 1999 (n=1977 and n=2186, respectively)	**Lifetime physical/sexual IPV** Report whether they had "ever been hurt physically or sexually by a date or someone they were going out with. This would include being shoved, slapped, hit, or forced into any sexual activity." (none, physical only, sexual only, both physical and sexual) **Sexual risk behaviors and outcomes** Condom nonuse at last intercourse, , ever been pregnant	**Prevalence** • 20.2% and 8% physical or sexual IPV **1997 AORs (95% CI)** **Condom nonuse last intercourse** • **Phys only: 2.0 (1.3-3.0)** • Sexual only: 1.3 (0.7-2.3) • Both: 0.9 (0.5-1.5) **Pregnancy history** • **Phys only: 2.5 (1.4-4.5)** • Sexual only: 1.8 (0.7-4.9) • **Both: 6.3 (3.4-11.7)** **1999 AORs (95% CI)** **Condom nonuse last intercourse** • Phys only: 1.3 (0.9-2.0) • Sexual only: 1.4 (0.8-2.5) • Both: 1.0 (0.6-1.7) **Pregnancy history** • **Phys only: 2.2 (1.2-4.0)** • **Sexual only: 3.2 (1.5-6.8)** • **Both: 3.9 (1.9-7.8)**	• Cross-sectional • Condom nonuse generally unassociated with any IPV (exception physical IPV only in 1997) • Representative sample of high school girls in Massachusetts (excludes those not in public schools) • Does not include information on non-condom contraception • Does not include emotional abuse

Table 3 Continued

Teitelman et al. (2008)[61]	Females enrolled during grades 7th-12th into the Add Health Study who completed Waves II (11-21 years old) and II (18-26 years old) and were sexually active at Wave III (n=2,058)	**Recent IPV (verbal/physical/sexual)** (since Wave II) **Sexual risk behaviors and outcomes** frequency of condom use, condom use during last intercourse, STI diagnosis **Past emotional or physical abuse** (between Waves I and II or last 18 months)	• 18% used condoms all the time in the past 12 months at Wave II **Odds of using condoms all the time at Wave III (OR (p-value))** **Prior abuse at Wave II** • Never physical: 1.53 (0.096) • Never verbal: 1.42 (0.093) • No to both: 1.68 (0.112) **Recent abuse at Wave III** • **No physical/verbal: 1.66 (<.001)** • Never forced sex: 1.52 (0.054) • **No phys/verbal or forced sex: 1.82 (0.042)** **Combined effects of abuse** • Wave II only: 0.77 (0.262) • **Wave III only: 0.61 (0.001)** • **Both: 0.48 (0.014)**	• Initial enrollment was nationally representative of 7th-12th graders in the United States • Models not adjusted • Past physical abuse not associated with future condom nonuse • Recently non-abused more likely to use condoms all the time • Indications of a cumulative effect • No information on non-condom contraception

Unlike condoms, other contraceptive methods largely can be hidden from male partners' knowledge. These methods include oral contraceptives, dermal patches, vaginal rings, and long acting reversible contraceptives such as IUDs, implants, and injections. Despite the apparent appeal of these methods for those in risky relationships, they are underutilized options for young women.[57,58]

Among 16-24 year old women who initiated oral contraceptive use at baseline, only 19% were continuing to use oral contraceptives one year later; perceived susceptibility to pregnancy was unassociated with contraceptive and condom use one year later.[66] This supports earlier work that indicates high rates of contraceptive discontinuation and aversion in this age group.[67-69] However, IPV and other relationship characteristics were not assessed in this study, preventing examination of partner influence on contraceptive choices. In studies that assess the impact of IPV on contraceptive use (Table 4), there is evidence that IPV is associated with more contraceptive method changes[21] and contraceptive nonuse [21,70] in some studies but was not associated with contraceptive nonuse in others.[52,71]

Table 4. Key studies on the association between intimate partner violence and non-condom contraceptive use

Author (Year)	Population and sample size	Measures	Results	Comments
Williams et al. (2008)[71]	Female patients in health care settings (EDs, obgyn, peds, primary care, addiction recovery), ≥ years who agreed to follow-up and had past-year male partner (n=225, 115 abused 110 controls)	**Contraceptive use** Past 12 months, if use >1, use most effective method chosen Discrepancy between actual and preferred method: select which method most prefer to use; if not using, coded as discrepant **Past-year IPV** CTS2 scale; no abuse, physical only, physical and/or emotional Sexual abuse separate	• 14.2% used no contraception • 7.6% preferred no contraception • Abused less likely to use pills (27.8% vs 46.4%, p<.01) and more likely to use condoms (33.0% vs 20.9%, p=0.04) **Contraceptive nonuse** **AOR (95% CI)** • Any abuse: OR=1.7 (0.8-3.7) • Physical only: 2.7 (0.8-9.5) • Phys ± emotional: 1.8 (0.7-4.8) • Sexual violence: OR=1.3 (0.6-2.9) **Contraceptive discrepancy** **AOR (95% CI)** • Any abuse: OR=1.5 (0.8-2.9) • Physical only: 0.8 (0.3-2.2) • Phys ± emotional: 1.5 (0.7-3.1) • Sexual violence: OR=0.9 (0.4-1.7)	• Potential participants approached even if with partner • Low participation rate (not interested, language barrier, not feeling well), not approached because ill, distressed, or acute injuries, • 50% follow-up • Adjusted for type of abuse, age, relationship status, sex in past 30 days • Does not capture patterns of use over time ("used at least once in past 12 months" versus "did not use at all in past 12 months") • Abuse unassociated with past-year contraceptive nonuse or contraceptive discrepancy
Roberts, Auinger, & Klein (2005)[52]	Sexually active, dating females in the Add Health study, ages 13-22 years (n=973)	**Verbal/physical IPV** Past verbal abuse, physical abuse, current verbal abuse, current physical abuse **Reproductive health outcomes** No condom or contraception use at most recent intercourse, history of STI or pregnancy	• 13% current verbal abuse • 6% current physical abuse • 23% past 18 month verbal abuse • 15% past physical abuse • 48% condom nonuse at last intercourse **Logistic regression model results AOR(95% CI)** **Contraception nonuse** • Past verbal: 1.29 (0.87-1.91) • Past physical: 1.08 (0.68-1.71) • Current verbal: 1.33 (0.84-2.11) • Current physical: 1.57 (0.88-2.81)	• Sexual IPV not captured • Contraception measure included condoms as well (as opposed to female-controlled methods only) • Adjusted for history of sexual coercion • Specific to adolescents • Nationally representative of those in school at Wave I • Cross-sectional

Table 4 Continued

Fantasia et al. (2012)[21]	Reproductive-aged female clients of four reproductive health clinics with at least 1 annual gynecological exam 2006-2011 (n=2000)	**Lifetime physical and sexual IPV** "have you ever been abused/felt unsafe in a relationship: (physical/emotional/sexual) threats or violence," "have you ever been forced to have sex when you didn't want to?" **Timing: 1**) IPV in the past year only, 2) past year IPV and during the past 5 years, 3) P-Y IPV plus violence extending for greater than 5 years and 4) no P-Y experiences but a previous history of IPV **Reproductive health outcomes** current contraceptive method, use of a "hidden" method (injectable and implantable progestins, IUD, sterilization), number of PY method changes, contraceptive method nonuse,	• 29% lifetime IPV • 6% past-year IPV only • 3% P-Y IPV & past 5 years • 2% P-Y IPV & >5 years • 18% no P-Y IPV & history of IPV • 13% hidden contraceptive method • Women in all violence categories had more frequent method changes in past year **IPV and using hidden contraceptive method** AOR (95% CI) • P-Y IPV only: 2.5 (1.4-4.4) • P-Y IPV & past 5 years: 5.4 (2.8-10.5) • P-Y & > 5 years: 2.7 (1.2-6.4) • No P-Y IPV & history of IPV: 2.5 (1.8-3.6) **IPV and not using birth control** AOR (95% CI) • P-Y IPV only: 9.7 (6.2-10.5) • P-Y IPV & past 5 years: 9.8 (5.8-18.3) • P-Y & > 5 years: 7.7 (3.3-17.6) • No P-Y IPV & history of IPV: 4.9 (3.5-7.0)	• Excluded women who experienced violence during childhood but not currently experiencing IPV • Models adjusted for race, ethnicity, age, education, employment, STI history • Unclear how well IPV screening was implemented and recorded in the medical record data

Male partners who perpetrate physical, sexual, emotional, or reproductive violence against their adolescent and young adult female partners frequently refuse to use condoms and create an environment in which the young women perceive threats or consequences to requesting condom use. Similarly, IPV is indicated as a risk factor for other contraceptive method nonuse. The majority of research on adolescents and young adults is not able to identify temporal patterns due to reliance on cross-sectional surveys. Limited conclusions can be made about how negative partner influence may affect contraceptive use over time in this particularly vulnerable population. Studies are needed that identify factors contributing to contraceptive nonuse or use of less effective contraceptive methods, with close attention to the ways partners may influence these behaviors in the context of IPV.

This project will address these current limitations in the literature. Aim 2 will assess partner influence on contraceptive use in a nationally representative cross-sectional sample of 15-24 year old women. Patterns of condom use, contraceptive method initiation and discontinuation, and reasons for nonuse will be assessed via self-report over a twelve month period. This will build on the current literature that indicates method nonuse and discontinuation with more detailed partner influence measures and identifying classes of women who are and are not exposed to partner influence. Aim 3 will address current methodological limitations.

2.3. METHODOLOGICAL LIMITATIONS OF CURRENT RESEARCH

The research to date on male partner influence on women's sexual health is limited by a number of methodological concerns. Problems with accurate exposure and outcome ascertainment, temporality, and selection biases preclude conclusions on the pathways leading to poor sexual

health outcomes. This project focuses specifically on these measurement challenges when collecting data via self-report or medical record abstraction. While the concordance between self-report and medical record data is relatively unexplored in the IPV literature, one study of poor pregnancy outcomes found low agreement between these data sources.[72]

Compared to other medical and public health concerns such as obesity, IPV is particularly difficult to study given high levels of shame, isolation, and stigma that limit case identification. The majority of studies on IPV/RC and sexual health outcomes rely solely on self-report (e.g., Silverman et al. 2001,[6] Miller et al. 2010[7]), with few incorporating medical record data (e.g., Johnson & Hellerstedst 2002,[49] Fantasia et al. 2012[21]). Self-report requires women to 1) be recruited into studies on violence, 2) recognize the behaviors listed on a survey as being consonant with their own experiences, and 3) feel comfortable endorsing these behaviors on a survey or to an interviewer. Conversely, collecting data via medical record charts is limited by 1) women receiving health care services, 2) providers feeling comfortable discussing and asking women about IPV, RC, and other sensitive topics, 3) women disclosing their experiences, and 4) providers documenting these conversations. Studies that rely solely on self-report or on medical record review are likely to underestimate the prevalence of IPV in that clinic population. ACOG released its recommendation to universally screen reproductive-aged women for reproductive coercion in 2013,[19] but it is likely that these recommendations are slow to be implemented in clinical practices. It is likely that even with these recommendations, data collected in medical records are either missing IPV/RC documentation or have been collected in a biased manner (e.g., at the clinician's discretion). Thus, ascertaining exposure to IPV likely varies by data collection method, resulting in information bias.

A second source of bias, social desirability bias is also possible when ascertaining IPV as well as sexual and reproductive health behaviors and outcomes. Social desirability bias occurs in sexual health research when reporting undesirable or sensitive behaviors directly to an interviewer compared to computer-assisted, self-administered questionnaires.[73,74] Thus, self-report as well as medical record data in which patients may have to directly disclose to their providers are both likely to be limited by this social desirability bias.

Temporality is another major gap in the IPV literature that often relies on cross-sectional data as noted above. Medical record data are prospectively collected, allowing temporal associations to be explored. However, this often requires that individuals continue to see the same provider or group of providers to obtain a complete medical history, which may or may not be the case or may not be known to the investigators. Self-report data allow for repeated measures to begin to establish temporality as long as good strategies are in place for retaining patients in IPV studies. It is likely that those women who are most impacted by IPV are less likely to have consistent medical care (i.e., medical record data will be incomplete) and to continue participation in a clinical research study. Thus, while longitudinal data collection and medical record review offer the opportunity to explore temporal patterns, the extent to which women experiencing IPV are adequately represented in those data is not known.

A final concern is the selection biases inherent in self-report and medical record data. When collecting medical record data from a particular healthcare institution, data from other institutions are likely missed. This has the potential to introduce considerable selection bias by the exposure of interest. For example, it is common in IPV/RC research to collect data from family planning clinics, where patients have higher rates of IPV and RC[7,10,56]; this excludes all chart data on healthcare seeking, testing, results, and procedures that occurred in general

practices, urgent care, emergency departments, and private obstetrics/gynecology offices. Care seeking behaviors, including the health care practices used, may vary based on particular health needs, such as using different organizations for STI testing and prenatal care. Further, women who intend pregnancy may be more likely to plan and then use private practices compared to clinics, creating possible biases. Institutions that offer a range of services (e.g., primary care, urgent care, emergency departments, and women's health) are less suspect to biases from differential care seeking compared to facilities that offer only a select number of specific services.

Conversely, women who expressly enroll in studies and are willing to answer sensitive questions via self-report on a computer survey may be quite different from the clinic population in general (for example, women represented in large secondary data-sets from a health care system) and the population at large. Given significant concerns about the safety of women participating in IPV studies, some protocols may specifically not approach women who present for care with a male partner[7] while other studies approach women to tell them about a study regardless of partner presence.[71] Those women who do participate likely differ in ways that are meaningful to the study (e.g., history of IPV, current acute trauma due to IPV).

In addition to the limitations described above, the literature also shows that adolescents and young adults' self-reports of STI and other sexual health behaviors and conditions have low concordance with medical record data[75,76] or self-reports over time.[77,78] However, it is unclear whether or how IPV and RC – especially given their associations with greater healthcare seeking[54,55] - may impact this variation across methods and populations and should be assessed.

As an example, consider research on partner violence and STI. Using self-report of IPV and biological specimens to test for current STI infections, investigators in one study found an association between physical and physical/sexual IPV and current STI infection, but those reporting sexual IPV only had a lower odds of having a current STI infection.[48] If this had been the extent of the data collected, one could conclude that physical IPV may be riskier for poor sexual health outcomes than sexual IPV. However, the additional self-reported data on STI history indicated that those who experience sexual IPV are more likely to have received STI testing and have been diagnosed with an STI in the past year.[48] Thus, the self-reported data provided a more complete picture of the association between IPV and sexual health outcomes, while the biological specimen testing confirmed successful treatment of past infections.

For this study, the concordance of IPV/RC self-report and medical record documentation will be compared in this study to reproductive and sexual health outcomes, specifically documentation of pregnancies and STI. Further, the impact that partner violence and pregnancy intention have on reporting concordance will be evaluated. This will allow researchers to make better informed decisions for future data collection in this vulnerable population.

2.4. THEORETICAL FRAMEWORK: SOCIAL COGNITIVE THEORY

Research to date points to the substantial influence partners may have on women's reproductive health, contraceptive use, and decision-making. In an attempt to explain these phenomena, investigators have drawn heavily from Social Cognitive Theory (SCT), which is used widely in the health promotion literature. SCT was first proposed by Bandura as a social learning theory in 1977.[79] SCT states that human behavior is a result of personal, behavioral, and environmental

factors continuously interacting.[79] It emphasizes both the social factors that influence an individual and the individual's own capacity to exact changes on him- or herself and others, learn, and self-regulate.[80]

Perceived self-efficacy, defined by Bandura as "the conviction that one can successfully execute the behavior required to produce the outcomes," (p. 193)[79] is the cornerstone of SCT. Self-efficacy is both directly and indirectly related to multiple pathways leading to health behaviors.[81] Briefly, self-efficacy impacts, among other things, how ambitious goals a person sets for him- or herself, outcome expectations, duration of effort, and perception of overcoming barriers.[81] These pathways may help to clarify how partner influences may impact young women's contraceptive behaviors and reproductive health.

Given that self-efficacy is a person's beliefs that he or she can accomplish certain tasks and goals, self-efficacy is best studied and understood in the context of specific domains[81,82]; as such, when examining sexual health and outcomes, self-efficacy specific to sexual activity needs to be considered. However, it should first be noted that sexual self-efficacy is conceptualized differently across studies, despite calls to standardize.[83] A review published in 2010 by Gloppen, David-Ferdon, and Bates highlights the heterogeneity across studies.[84] For example, sexual self-efficacy incorporates concepts such as "self-efficacy to refuse unwanted sex," "self-efficacy to negotiate condom use," and "self-efficacy to use condoms."

Evidence is relatively sparse on a possible relationship between IPV and sexual self-efficacy, but findings to date indicate that recent experiences of IPV are associated with decreased sexual self-efficacy.[85,86] However, these populations are restricted to older adult women. This possible relationship between IPV and sexual self-efficacy should be assessed in a more representative sample of adolescent and young adult women.

The relationship between self-efficacy and safer sex practices has been explored in the literature more thoroughly than the relationship with IPV, with findings indicating a positive association. Sexual self-efficacy has been associated with intended[87] and actual condom use,[87,88] use of female-controlled contraceptive methods,[88] not engaging in unprotected intercourse,[88-90] and refusing unwanted sex,[91] in adolescent and young adult females. These findings indicate that the association between sexual self-efficacy and sexual health behaviors is well established in the literature.

In contrast, few studies have assessed the associations between physical/sexual violence, self-efficacy, and sexual health (Table 5). A study conducted by Sales and colleagues (2008),[92] which did not limit its definition of forced vaginal or anal intercourse to intimate relationships, found that this history of sexual violence is associated with condom nonuse among African American adolescent females (15-21 years).[92] History of sexual violence was also associated with lower sexual communication self-efficacy and being more fearful of condom use negotiation; these factors mediated the relationship between sexual violence and condom nonuse.[92]

Two studies limited their definitions of violence to dating relationships. A study conducted by Beadnell and colleagues (2000)[93] of adult women at risk for STIs and HIV found that while physically abused women had higher HIV/STD risk scores and lower self-efficacy to negotiate male condom usage with partner compared to non-abused and emotionally-only abused women, they were no more likely to have poor condom usage. Wingood and DiClemente (1997)[43] conducted a study of young adult African American women (18-29 years) similarly found that physical abuse was associated with both perpetrated and perceived consequences of negotiating condom use, including experiencing verbal abuse or threats of physical abuse and

perceiving risk of verbal abuse or physical abuse. However, unlike Beadnell's findings,[93] physically abused women in Wingood and DiClemente's study were more likely to report not using condoms at all or less frequently compared to women who were not recently physically abused.[43] Physical abuse assessment and referent time periods were similar between these two studies.

SCT provides a theoretical framework through which to consider the impact of males perpetrating violence and controlling their female partners' reproductive health. While there is not substantial evidence, findings suggest that the association between IPV and sexual health behaviors and outcomes may be mediated, in part, through sexual self-efficacy. As previously reviewed, there are both actual and perceived consequences to negotiating condom use in abusive relationships.[14,40,43,64] Self-efficacy is key to overcoming these very real barriers to safer sex practices. Overall, these findings suggest that, at least among adolescent and young adult women, self-efficacy plays a role in maintaining sexual and reproductive health through influencing safer sex behaviors; evidence is most compelling for inconsistent condom usage, increasing vulnerability to unwanted pregnancies and STIs. Sexual self-efficacy should be further explored as an explanatory factor in the relationship between IPV and sexual health behaviors and outcomes. Elucidating temporality of these associations using a longitudinal design could provide potential targets for decreasing the health burden caused by IPV, especially in young, vulnerable populations.

Table 5. Key studies on the association between intimate partner violence, sexual self-efficacy, and sexual health outcomes

Author (Year)	Population and sample size	Measures	Results	Comments
Sales et al. (2008)[92]	Sexually active African Americans females (15-21 years) survey data from an HIV-prevention intervention (n=715)	**Sexual violence:** "has anyone ever forced you to 1) have vaginal sex when you didn't want to, 2) have anal sex when you didn't want to? **Fear of consequences of condom negotiation:** 7 item scale, "I have been worried that if I talked about using condoms, my boyfriend or sex partner would…" leave me, threaten to hit me, hit me, etc. **Sexual communication self-efficacy**: 6 item scale, including "with a sex partner, how hard is it for you to ask how many sex partners he has had?" and "with a sex partner, how hard is it for you to ask if he would use a condom?" **Sexual health:** condom use at last intercourse, use in the last 60 days (# of times used condoms / # of sex acts; 100% = consistent condom users, >50% high, =<50% low)	• Lifetime sexual violence 26% • Less likely to use condoms at last intercourse (31.2% vs 46.9%, p<.001), using condoms consistently in the past 60 days (13.9% vs 29.1%, p<.001), being categorized as frequent condom users (35.4% vs 53.6%, p<.001) • More fearful of condom use negotiation (mean=11.1 vs 9.9, p<.001) • Lower sexual communication self-efficacy (mean=19.9 vs 21.0, p<.0o1) • Sexual communication self-efficacy and fear of condom use negotiation consequences mediated the relationship between sexual violence and all three sexual behavior outcomes	• Only captures severe sexual violence • Violence not specified to partner • Mediation analysis, used Sobel test • Biases in who would enroll in an HIV-prevention intervention • Cross-sectional
Beadnell et al. (2000)[93]	Women with steady partner(s) in the past 4 months were selected from 202 women enrolled in a safer-sex intervention study; 18 years of age or older and at risk for HIV/STIs (n=167)	**IPV:** Your steady partner…1)said things that hurt you or made you feel bad about yourself, 2)tried to control where you go, who you see and/or what you do, 3)threatened to physically hurt you, 4)hit, pushed, shoved, kicked, slapped, or in any other way physically hurt you' **Sexual health:** STD/HIV Risk score: relative power for decision making, unwanted sex, partner non-monogamy, **self-efficacy for condom use, self-efficacy for female barrier method use** Self-efficacy measured on 7 point Likert scale from "not at all likely" to "very likely"	• No abuse: 42% • Emotional only: 42% • Physical/emotional: 16% • **Physical abuse had highest STD/HIV risk score (p<.01) and lowest self-efficacy to get partner to use condoms score (p<.01),** but not more likely to report using male condoms half the time or less	• Cross-sectional • Women were specifically screened into a safer-sex intervention study • Excluded those whose lives were not "stable enough" for a four month intervention
Wingood & DiClemente	Heterosexually-active African American women, 18-29	**IPV:** "During the past 3 months, has your primary partner physically abused you (i.e., slapped or hit you)?" **Sexual health:** Condom use: # of times used condoms / # of episodes of	• 17.6% reported physical abuse in past 3 months • **Physically abused women more likely to report not using condoms at all (71.4%**	• Unstable confidence intervals, but the trends across the items indicates strong associations

Table 5 Continued

(1997)[43]	years (n=165)	intercourse **Consequences of condom negotiation:** "When you asked your primary partner to use condoms, how often were you… 1) verbally abused, 2) threatened with physical abuse, 3) threatened with abandonment **Perceived consequences of negotiating condom use:** "How often have you been scared to talk with your primary partner about using condoms because you thought your primary partner might be… 1) physically abusive, 2) verbally abusive, 3) threatened to physically abuse you, 4) threaten to abandon you	**vs 42.6%, p=0.04) or less frequently (22% vs 44%, p=0.04) compared to not recently abused women** **Consequences of negotiating condom use PR (95% CI)** • **Verbal abuse PR=4.2 (1.9-9.3)** • **Threaten physical abuse PR=9.2(2.5-34.6)** • **Threaten abandonment PR=3.7 (1.1-13.0)** **Perceived consequences of negotiating condom use** • **Physical abuse PR=6.5 (2.3-18.9)** • **Verbal abuse PR=4.1 (1.7-9.7)** • **Threaten physical abuse PR=3.3 (1.1-9.6)** • **Threaten abandonment PR=3.7 (1.1-13.0)**	• No actual measurement of self-efficacy, have to infer from real and perceived consequences to condom use negotiation • Cross-sectional • Results not adjusted for any demographics or other possible confounders • Accuracy of condom use measure?

2.5. CONCLUSIONS

Male partner perpetrated IPV and RC have been associated with poor reproductive and sexual health outcomes among adolescent and young adult women, who have are disproportionately affected by IPV/RC.

While primary prevention is critical (i.e., preventing men from perpetrating such violence), it is clear that secondary prevention efforts are necessary to reduce negative consequences of such victimization. Key gaps in IPV and reproductive/sexual health research ned to be addressed to guide intervention efforts.

First, the pathways between IPV/RC and sexual and reproductive health outcomes should be elucidated to identify potential targets for intervention. SCT provides one possible explanatory factor: sexual self-efficacy, which has been identified in the literature as an attribute that is related to both IPV and sexual health behaviors and outcomes in a few independent studies. While some of the studies that have attempted to integrate IPV exposure, sexual self-efficacy, and sexual health outcomes have had inconsistent findings, the literature overall suggests that sexual self-efficacy may partially explain the poorer health outcomes among some victims of IPV. As sexual self-efficacy has been shown to be modifiable in interventions specifically for sexual and reproductive health,[94-96] it is imperative to determine its place in the pathway to inform future interventions (Aim 1).

Second, research indicates that women with negative male partner influence may use contraceptives differently, both in initiation, continuation, and compliance. Both IPV and RC are related to contraceptive nonuse, regardless of the woman's preferences. Long-acting reversible

contraceptives (LARC) are available and recommended for adolescent and young adult women, but are greatly underutilized in this younger age group.[58] The more commonly used methods, such as oral contraceptives, have high rates of discontinuation or poor use.[58,66] Non-LARC, female-controlled methods, including oral contraceptives and hormonal rings, have the potential to be tampered with by male partners.[97,98] Condoms are less likely to be used by abusive male partners,[43,61-63] thus precluding use of a contraceptive method and the best protection against STIs. Identifying how male partners influence contraceptive use patterns can inform both clinicians and public health practices to provide the optimal care and programs for affected women (Aim 2).

Finally, research on IPV and its associated sequelae is particularly difficult. Unlike many medical conditions, there are no biomarkers or concrete "tell-tale" signs. Assessment requires a combination of asking the right questions (whether it be a written survey, interviewer, or healthcare provider), the woman identifying behaviors she has experienced as unhealthy or abusive, and the woman being able and willing to disclose. Current research is limited by studies that mainly use exclusively self-report or exclusively medical record data. Given the considerable energy and expense that can be associated with collecting medical record data, it should be ascertained how much this substantially adds to the reliability of IPV assessment. Possible biases should be explored with each method. Ultimately the goal is to identify best methods for IPV research moving forward (Aim 3).

In summary, IPV is highly prevalent in the U.S. and has been associated with many poor reproductive and sexual health outcomes, including unintended pregnancies and STIs. Condom nonuse, fear of negotiation, and other contraceptive nonuse are mechanisms linked to IPV exposure, and reflect the multiple ways that male partners can influence women's reproductive

and sexual decision making. RC, a phenomenon characterized by male partners trying to control their female partners' reproductive choices, is gaining attention for how it may explain some of the associations observed in the literature. Elucidating protective factors, mechanisms, patterns, and best methodologies for this research will inform secondary prevention efforts to reduce the sequelae associated with IPV/RC.

3. ADDRESSING REPRODUCTIVE COERCION IN HEALTH SETTINGS STUDY

The Addressing Reproductive Coercion in Health Settings study (ARCHES) (PIs: Miller and Silverman; NIH grant # R01HD064407) is a cluster randomized controlled trial (RCT) to test the effectiveness of a clinician-delivered brief intervention on IPV and RC during routine clinical visits compared to standard of care in twenty-four family planning clinics in Western Pennsylvania. The goal of the intervention is universal education and reducing risks and associated consequences of IPV, RC, and unintended pregnancies. Women ages 16-29 years who were receiving care at participating family planning clinics for any reason, could speak English or Spanish, and were able to give consent were eligible to participate. A total of 3687 women agreed to participate; current analyses will be restricted to women 16-19 years of age (n=850) and 20-24 years of age (n=1,396) at enrollment who reported a history of heterosexual sex for a total of 2,246 women. The division of age groups into 16-19 and 20-24 years is consistent with the National Survey of Family Growth reporting on contraceptive use and pregnancy data.[34]

Women completed surveys at baseline (prior to clinical encounter), at a four month follow-up (T2), and a twelve month follow-up (T3) (Figure 1). Women self-reported demographics, recent and lifetime experiences of IPV, recent RC, self-efficacy (general, condom negotiation, use of harm reduction behaviors), recognition of sexual and reproductive coercion, lifetime and recent history of pregnancy, unintended pregnancy, and abortions, and for baseline only, future pregnancy intention (see Appendix for key measures used in the current study, Aims

1 and 3) . Women also completed an exit survey immediately following their clinical visit to assess intervention fidelity. All surveys were taken using an audio computer-assisted self-interview program (ACASI) on laptops, which participants took in private rooms of the clinics. Participants 18 years and older completed the follow-up surveys in person on the laptops or via telephone or online; 16 and 17 year old participants completed the follow-up surveys in person on the laptops or via telephone. Medical record data were abstracted for one year pre-enrollment through eighteen months post-enrollment for thirty months total. HIPPA waivers were healthcare organization-specific, so data were available at all sites for women who moved between clinics within a given organization; information on healthcare received at outside institutions was not collected.

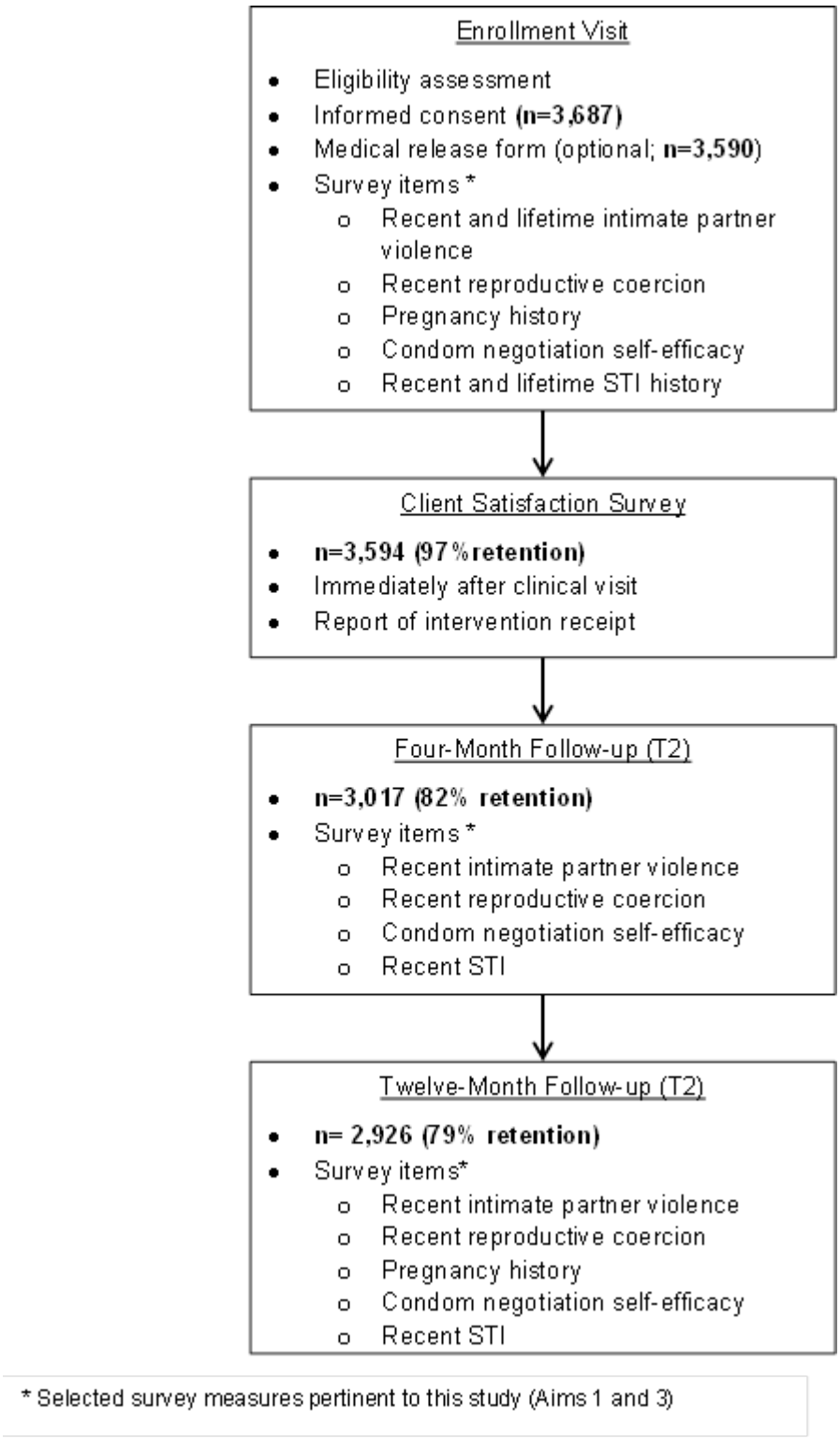

Figure 1. Addressing Reproductive Coercion in Health Settings Flow Chart

4. NATIONAL SURVEY OF FAMILY GROWTH

The National Survey of Family Growth (NSFG) is a nationally representative survey of men and women 15-44 years of age in the United States.[9] It is commissioned by the Centers for Disease Control and Prevention's National Center for Health Statistics. The purpose of the survey is to create nationally representative estimates for pregnancy and pregnancy risk, medical care associated with pregnancy, factors affecting household structure (e.g., marriage, divorce), adoption, father involvement behaviors, and attitudes about marriage, childbearing, and sex. The latest complete cycle was conducted in 2006-2010 among 12,279 women and 10,403 men. Data are collected through administration of a one-time cross-sectional survey (e.g., no longitudinal follow-up).

For this study, the relevant data are the extensive contraceptive use histories that women self-report and span up to the past four years, including types of methods used on a month-by-month basis and reasons for discontinuation. Of the 12,279 women interviewed, 4,382 were between the ages of 15-24 years. After excluding those who had never had sex with a male, were pregnant, post-partum, or trying to become pregnant, and those who could not become pregnant, 2,541 women remained eligible for analysis (15-19 years, n=972; 20-24 years, 1,569).

5. MANUSCRIPT 1: PARTNER VIOLENCE, CONDOM NEGOTIATION SELF-EFFICACY, AND SEXUAL HEALTH OUTCOMES AMONG ADOLESCENT AND YOUNG ADULT FEMALE FAMILY PLANNING CLIENTS: A MEDIATION ANALYSIS

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5.1 ABSTRACT

Context: Partner violence (including physical and sexual violence and reproductive coercion) is associated with unintended pregnancy and sexually transmitted infection (STI). Condom negotiation self-efficacy (CNSE) may mediate this relationship among adolescent and young adult women.

Methods: A randomized controlled trial with one year follow-up was conducted in family planning clinics to test an intervention on reducing partner violence and its adverse consequences (age range: 16-24 years, n=2,246). Adolescent (16-19 years; n=850) and young adult women (20-24 years; n=1,396) reported on partner violence, CNSE, unintended pregnancy, and any STI at enrollment, four months, and twelve months follow-up. Mixed models were used in a secondary data analysis to test associations between partner violence and unintended pregnancy/any STI, adjusting for race/ethnicity and intervention arm. The Sobel test of mediation was conducted using a SAS macro developed for binary outcomes to measure the indirect effects of CNSE.

Results: Recent (past three month) partner violence was reported by 11.5% of adolescents and 8.9% of young adults at baseline. Adolescents reporting partner violence had significantly lower CNSE (β=-2.04, 95% CI -0.65, -0.143) and 5% higher odds of unintended pregnancy (AOR=1.05, 95% CI 1.00,1.10) over follow-up. Among adolescents, CNSE mediated the relationship between partner violence and unintended pregnancy (Sobel test <.05), but not STI diagnosis. Among young adults, partner violence was associated with decreased self-efficacy (β=-0.157 [-0.211,-0.104]) and higher odds of unintended pregnancy (AOR=1.05 [1.00,1.09]).

Condom negotiation self-efficacy only mediated the relationship between partner violence and unintended pregnancy (Sobel test $p<.01$).

Conclusions: Partner violence is associated with decreased condom negotiation self-efficacy among both adolescents and young adults; this partially mediates the relationship between partner violence and unintended pregnancy, but not STI. This finding indicates that women with abusive partners may not be able to successfully negotiate condom use, despite having the self-efficacy to do so. STI prevention may require additional strategies beyond increasing condom negotiation skills.

5.2 BACKGROUND

Unintended pregnancy and sexually transmitted infections (STI) are disproportionately prevalent among adolescent and young adult females in the U.S. Three-quarters (77%) of births to 15-19 year olds and half (50%) of births to 20-24 year olds result from unintended pregnancy.[34] STIs are also common in these age groups, representing half of new cases,[99] and may lead to pelvic inflammatory disease, infertility, and ectopic pregnancies.[46] Physical and sexual intimate partner violence (IPV) and reproductive coercion (RC; attempts to control pregnancy and pregnancy outcomes of female partners) are also widespread among adolescent and young adult women.[7,11] Understanding the mechanisms linking IPV/RC to reproductive outcomes among adolescent and young adult women is needed to target intervention efforts that aim to reduce unintended pregnancy, STI, as well as IPV/RC.

The literature on IPV/RC clearly links these experiences to poor reproductive and sexual health outcomes such as unintended pregnancy and STI. Young women who have experienced IPV, RC, or both, have higher odds of unintended pregnancy[7,11] and greater difficulty obtaining and using contraception.[41] These women also are more likely to report a history of STI[47-49] and test positive for a STI.[48] One pathway by which partner violence can lead to unintended pregnancy and STI is via condom nonuse, as young women who experience IPV use condoms less frequently[6,40,47,48,52,61,65] and have greater barriers to condom use.[14,40,43,64]

Condom use is part of sexual self-efficacy, an important factor in understanding these associations. Self-efficacy is a construct that captures a person's beliefs that he or she can accomplish certain tasks and goals. In terms of sexual health, this can include self-efficacy to

negotiate condom use, refuse unwanted sex, and use contraception. Sexual self-efficacy (SSE) has been associated with condom use,[87,88,100] non-condom contraceptive use,[88] and not engaging in unprotected intercourse[88-90,101] in adolescent and young adult women. Thus, SSE is a promising avenue for exploration as a possible mechanism linking IPC/RC with unintended pregnancies and STI, and may ultimately provide an opportunity for prevention and intervention in girls.

To further our understanding of the causal pathway between IPV/RC and unintended pregnancy/STI, we have identified condom negotiation self-efficacy (CNSE) as a possible mediator in the relationship between partner violence and unintended pregnancy/STI among adolescent and young adult women. CNSE is particularly relevant because condom usage requires a male partner's cooperation, and is also a protection against STI. Additionally, as the literature has shown that partner violence is associated with greater barriers and perceived consequences to condom negotiation,[14,40,43,64] we hypothesized that CNSE would be directly affected by IPV/RC.

Research indicates that sexual[102] and emotional[103] self-efficacy naturally increase with age over adolescence (i.e., without outside intervention). SSE has also been shown to be higher among sexually active adolescents,[104] and sexual self-concept increases with increasing sexual experiences.[105] The associations between sexual self-efficacy and behavior may also vary by age. For example, in one cross-sectional study of SSE, birth control self-efficacy was associated with contraceptive use among girls in 10th and 11th grade, but not among younger girls in 7th-9th grades.[106] In another study, communication with a partner about contraception prior to sex was associated with using effectiveness contraception among 13-20 year olds, but not 21-25 year olds.[107] Further, a review found that early pubertal timing and relatively more advanced pubertal

status were associated with more sexual acts and riskier sexual behaviors among adolescents.[108] As SSE develops across adolescence and as girls become more experienced, age should be taken into consideration in assessments of IPV/RC, CNSE, and reproductive health.

This study uses a large dataset from 24 rural and urban family planning clinics to test associations among age, CSNE, IPV/RC, and reproductive health. For this study, we first hypothesized that CNSE would be lower among adolescent women (16-19 years) compared to young adult women (20-24). Second, we hypothesized that among these two age groups, women who experience recent IPV or RC would have lower CNSE, more unintended pregnancy, and more STI compared to women who have not recently experienced IPV or RC. Finally, we hypothesized that CNSE would mediate the association between IPV/RC and unintended pregnancy/STI among both age groups.

5.3 METHODS

5.3.1 Study design and sample

The present study uses data that were collected as part of the Addressing Reproductive Coercion in Health Settings (ARCHES) Study (R01HD064407: Miller & Silverman), a cluster randomized controlled trial to test a clinician-delivered brief intervention on RC/IPV. The study protocol has been described in detail elsewhere.[109] Briefly, this study was conducted in 24 Western Pennsylvanian family planning clinics and enrolled women 16-29 years of age. Women were approached by research staff when they arrived for their clinical care appointments. Interested women were consented and completed the baseline survey in a private area of the clinic. Parental

consent was waived for minors, as they were receiving confidential services. A total of 3,687 women enrolled at baseline (of which 2,697 were ages 16-24).

Surveys at baseline, a four-month follow-up, and twelve-month follow-up were completed using ACASI software on a laptop computer at the clinic. Participants could also complete the follow-up surveys via an online survey (ages 18 and older) or telephone (all ages). The University of Pittsburgh Institutional Review Board approved all study procedures. A federal Certificate of Confidentiality was obtained to protect participant confidentiality. The present study is restricted to women who reported heterosexual sexual intercourse and provided complete information for all key measures on a survey. The heterosexual sex restriction is due to survey design on the pertinent questions for the parent study. Those missing values on demographics were assigned the modal response for modeling. The final sample size for this study is n=2,246 (16-19 years, n=850; 20-24 years, n=1,396).

5.3.2 Key measures

Past three month intimate partner violence (IPV) was assessed using three items modified from the CTS-2[110] and Sexual Experiences Survey[111]: one for physical IPV and two for sexual IPV. *Reproductive coercion* (RC) was assessed using ten items developed by Miller and colleagues for use in adolescent and young adult populations.[7,11] Items included "tried to force or pressure you to become pregnant" and "taken off the condom while you were having sex, so you would get pregnant." For both the IPV and RC scales, answering yes to one or more items was coded as positive for IPV or RC, respectively. Women who endorsed any of these IPV or RC items were identified as having experienced *recent partner violence*. These measures were collected at baseline, the four month follow-up, and the twelve month follow-up.

The reproductive health outcome *unintended pregnancy* was assessed at the twelve month follow-up using seven items on pregnancy desire and planning from the National Survey of Family Growth.[9] Lifetime history of unintended pregnancy was assessed at baseline with one item: "How many times have you been pregnant when you didn't want to be?" The reproductive health outcome *STI diagnosis* was assessed in all surveys by querying women as to whether they had been told by a doctor or other health care professional that they had an STD, with listed examples: " chlamydia, gonorrhea (also known as the clap), syphilis, herpes, genital warts, Hepatitis B, and HIV"; the baseline survey used referent time periods of lifetime and past three months and the follow-up surveys specified past three months only.

Condom negotiation self-efficacy (CNSE) was assessed at baseline, four-month follow-up, and twelve-month follow-up using five items that assessed participants' confidence to request condom use and refuse unprotected sex (e.g., "I feel confident in my ability to suggest using condoms with a new partner" and "If my partner didn't want to use a condom during sex, I feel confident in my ability to refuse to have sex"). Items were adapted from the 28 item Condom Use Self-Efficacy Scale that was originally created for young adults (college students).[112] Response options were on a 5 point Likert scale from "strongly agree" to "strongly disagree" and the mean score was calculated.

5.3.3 Analysis

Chi square analyses assessed whether demographic characteristics differed by age group (Adolescent versus Young Adult) and by inclusion status in the present analysis (included in final analytic sample versus excluded). Chi square and linear regression tests were used to determine if partner violence and CNSE, respectively, varied by age group. To conduct the mediation analysis, a SAS macro created by Jasti and colleagues[113] was used. This macro is

based on work by MacKinnon and Dwyer,[114] who described standardizing the coefficients from logistic regression models to allow for a Sobel test to be used in cases of binary outcomes or mediators. Using this macro, adjusted linear and logistic regression mixed models were used to determine 1) the effect of partner violence on CNSE; 2) the effect of partner violence on unintended pregnancy and STI and; 3) the combined effects of partner violence and CNSE on unintended pregnancy and STI. A Sobel test was then conducted with the linear regression coefficients and standardized logistic regression coefficients. Use of the mixed models allowed for recent partner violence, CNSE, and unintended pregnancy/STI outcomes to be time-varying (i.e., all data points collected on these measures were used). Race/ethnicity and intervention arm were adjusted for in all models.

Survey data analysis methods were used to account for the clustering of patients within clinics, with clinic clusters being the unit of randomization for the parent RCT. All analyses were conducted using SAS version 9.4[96] and with a significance level set at alpha=0.05.

5.4 RESULTS

5.4.1 Participant characteristics

Almost two-thirds (62.2%) of the participants were 20-24 years of age (Table 6). Participants were predominantly non-Hispanic White (79.4%) with no racial/ethnic differences by age. The majority of women (71.6%) were receiving care at clinics designated as rural by the Bureau of Commerce,[115] with no differences by age. Adolescents were more likely to report recent partner violence (19.8%) compared to young adults (14.5%). Conversely, young adults were more likely to report a past-year unintended pregnancy (15.0%) and ever being diagnosed with an STI

(31.5%) compared to adolescent women (9.7% and 20.0%, respectively). Mean CNSE (SE) was 4.45 (0.01) on a 1 to 5 scale, with no difference by age group.

Participants 16-24 years who were excluded from the present analysis had a higher proportion of adolescents (55.2%) compared to those who were included (37.9%, p=0.01) and were more likely to report being single or dating more than one person at baseline (58.3 vs. 31.3%, p<.01). Participants who were excluded did not differ from included participants on baseline partner violence, past-year unintended pregnancy, or lifetime STI diagnosis.

To account for possible confounding, age group was also tested for difference in baseline partner violence and CNSE while adjusting for race/ethnicity and intervention status. Age group was still significantly associated with reporting recent partner violence, with adolescents having a 46% higher odds of reporting victimization compared to young adult women (AOR=1.46, 95% CI 1.11-1.92) in the adjusted model. Age group was not associated with baseline CNSE (β=-0.016, p=0.56) in the adjusted model.

5.4.2 Incident partner violence and reproductive/sexual health outcomes during follow-up

Recent partner violence was reported by 11.5% of adolescents at the four-month follow-up and 11.9% at the twelve month follow-up (Table 7). Among young adults, 8.9% reported recent partner violence at four-month follow-up and 8.6% at the twelve month follow-up. Recent STI diagnosis was reported by 5.2% of adolescents at four month follow-up and 3.8% at the twelve month follow-up. Among young adult women, STI diagnosis was reported by 4.0% and 3.5% at the four and twelve month follow-ups, respectively. Past-year unintended pregnancy was reported at the twelve month follow-up only by 16.6% of adolescents and 16.6% of young adults.

5.4.3 Mediation analysis

Among adolescents, recent partner violence was associated with significantly lower CNSE (β = -2.04, 95% CI -0.65, -0.143) and unintended pregnancy (AOR=1.05, 95% CI 1.00-1.10) (Table 8). CNSE mediated the effect of partner violence on unintended pregnancy (indirect effect=0.004, Sobel test p<.05), with higher CNSE associated with reduced odds of reporting an unintended pregnancy (AOR=0.96, 95% CI 0.93-0.99). Of the total effect of partner violence on unintended pregnancy, 18.9% is estimated to be due to mediation through CNSE. Partner violence was also associated with increased odds of reporting an STI diagnosis during follow-up (AOR=1.06, 95% CI 1.03-1.08), but CNSE did not mediate this effect.

Among young adult women, partner violence was associated with decreased CNSE (β = -0.157, 95% CI -0.211, -0.104). Partner violence was associated with unintended pregnancy (AOR=1.05, 95% CI 1.00-1.09), with its effect mediated by CNSE (indirect effect=0.004, p<.01). Higher CNSE was associated with lower odds of reporting an unintended pregnancy (AOR=0.95, 95% CI 0.93-0.98), with this mediation accounting for 24.8% of the total effect of partner violence. Recent partner violence was associated with higher odds of reporting an STI diagnosis (AOR=1.05, 95% CI 1.03-1.07), but this effect was not mediated by CNSE.

5.5 DISCUSSION

This study represents an important first step in determining the role that partner violence plays in the reproductive health problems in women in primarily rural settings. These findings indicate that partner violence is associated with lower condom negotiation self-efficacy, increased unintended pregnancy, and increased STI diagnosis among adolescent and young adult women.

Furthermore, condom negotiation self-efficacy (CNSE) mediated the relationship between partner violence and unintended pregnancy, but not partner violence and STI diagnosis.

Contrary to our hypothesis and the literature on SSE in general, CNSE did not vary by age group. Partner violence was more prevalent among adolescent compared to young adult women, and it was associated with lower CNSE as hypothesized. This finding is consistent with previous studies. For example, Wingood and DiClemente found that physical IPV was associated with perceived and perpetrated consequences to condom use negotiation, such as experiencing verbal abuse or threats of physical abuse or fearing risk of abuse.[43] Beadnell and colleagues similarly showed that physically abused women had lower CNSE compared to non-abused women.[93]

Higher CNSE was associated with lower odds of unintended pregnancy, but surprisingly, was not associated with STI diagnosis. It is possible that women with higher CNSE are also more likely to use other forms of contraception that provide more reliable protection against unintended pregnancy, such as the longer acting reversible contraception options of intrauterine devices and hormonal implants. However, these methods were only used by 2.4% and 5.1% of non-pregnant adolescents and young adult women, respectively, at study enrollment. For STI, however, since women report multiple barriers to condom negotiation and use with abusive partners,[14,40,43,64] CNSE may not translate into actual condom use. In other words, a woman's CNSE may not necessarily influence her partner's condom use behaviors. Alternatively, STI are often asymptomatic, which may lead to reduced diagnosis and reporting in this sample.

This sample of adolescent and young adult women had a high lifetime prevalence of STI diagnosis and unintended pregnancy at baseline. Many have already experienced negative reproductive health outcomes, consistent with the higher prevalence of lifetime unintended

pregnancy and STI in more urban family planning populations. While partner violence and CNSE were shown to impact odds of unintended pregnancy and STI, effect sizes were small in comparison to past sexual health experiences. Targeted interventions with younger adolescent females to promote healthy relationships, practice condom negotiation skills, and increase contraceptive use prior to initiating sexual activity may be the most effective in reducing these negative sexual health outcomes. Additionally, these findings suggest that clinic-based brief counseling interventions for young women with prior histories of unintended pregnancy may benefit from strengthening condom negotiation skills in addition to promoting female contraception. Prevention of STI, however, may require additional strategies beyond a focus on increasing condom negotiation skills.

As the majority of prior studies examining the effect of partner violence on unintended pregnancy, STI, and sexual self-efficacy have been cross-sectional, a major important strength of this study is the longitudinal design which allows us to demonstrate temporal relationships. Allowing for time-varying measures of partner violence, CNSE, and the outcomes (STI at two timepoints, unintended pregnancy at one), better captures the changes in CNSE and partner experiences that we would expect in a young woman's yearlong timespan.

However, there are a few limitations to note. Due to missing data, women excluded from the analysis were younger and less likely to be in stable relationships at baseline. However, as there were no differences in baseline reports of partner violence, unintended pregnancy, or lifetime STI diagnosis, we do not believe that the missing data exclusions substantially impacted our results. As women were recruited from primarily rural family planning clinics in western Pennsylvania, findings may not be representative of the general adolescent and young adult female population. Specifically, our study should be replicated in more racially and ethnically

diverse populations, including urban dwelling women. Nonetheless, this study represents women in more rural areas who may have different reproductive health needs and barriers compared to more urban settings. Finally, the estimated effects of partner violence and CNSE were small but significant. This is likely due to the strong predictability of unintended pregnancy and STI history with future cases; thus the majority of the cases have been "explained" before considering partner violence and CNSE. This underscores the need to target younger women before sexual activity begins to prevent first cases of unintended pregnancy and STI.

In a sample of sexually active adolescent and young adult women, partner violence was associated with increased odds of unintended pregnancy and STI diagnosis within a one year period. Condom negotiation self-efficacy mediated nearly one-fifth (18.9%) and one-quarter (24.8%) of the total effect of partner violence on unintended pregnancy in adolescents and young adult women, respectively, although there was no evidence of a mediation effect with STI diagnosis. Future interventions in this population should focus on increasing condom negotiation self-efficacy, as sexual self-efficacy is modifiable. Such programs should target younger women prior to unintended pregnancy and acquisition of STI.

5.6 TABLES

Table 6. Participant characteristics at baseline (n=2,246)

	Total (n = 2,246) % (n) [a]	Adolescent (n = 850) % (n) [a]	Young adult (n = 1,396) % (n) [a]	Wald log linear χ^2 p value [b]
Total		37.9 (821)	62.2 (1,344)	
Race/ethnicity				0.688
Black/African-American	14.2 (318)	14.8 (126)	13.8 (192)	
White	79.4 (1,783)	78.4 (666)	80.0 (1,117)	
Multiracial or Other	6.1 (136)	6.1 (52)	6.0 (84)	
Relationship status				**0.002**
Single/dating more than one person	31.3 (702)	30.5 (259)	31.7 (443)	
Dating one person/In a serious relationship	63.9 (1,435)	67.7 (575)	61.6 (860)	
Married	4.1 (92)	0.8 (7)	6.1 (85)	
Clinic cluster region [c]				0.119
Rural	71.6 (1,607)	74.4 (632)	69.8 (975)	
Urban	9.7 (218)	8.8 (75)	10.2 (143)	
Both rural and urban sites	18.7 (421)	16.8 (143)	19.9 (278)	
Recent partner violence	16.5 (370)	19.8 (168)	14.5 (202)	**0.015**
Past year unintended pregnancy	13.0 (292)	9.7 (82)	15.0 (210)	**0.001**
Lifetime STI diagnosis	27.1 (609)	20.0 (170)	31.5 (439)	**0.0003**
	100.0	100.0	100.0	
Condom negotiation self-efficacy, mean (SE)	4.45 (0.01)	4.44 (0.02)	4.46 (0.02)	0.683 [d]

[a] Percentages may not sum to 100 due to small amounts of missing date and rounding

[b] χ^2 p values are from Wald tests adjusted for clustered survey design

[c] Clinics were assigned to clusters based on share providers for the parent study, allowing for clusters with both urban and rural sites

[d] SAS®[96] PROC SURVEYREG was used to obtain p values for continuous variables and adjusted for clustered survey design

Table 7. Key outcomes at 4- and 12-month follow-up phases

	T2 (4 month follow-up)		T3 (12 month follow-up)	
	Adolescents (n=611) % (n)	**Young adults (n=1,047) % (n)**	**Adolescents (n=679) % (n)**	**Young adults (n=1,086) % (n)**
Partner violence	11.5 (70)	8.9 (93)	11.9 (81)	8.6 (93)
Past year unintended pregnancy	---	---	16.6 (113)	16.6 (180)
Recent (past three month) STI diagnosis	5.2 (32)	4.0 (42)	3.8 (26)	3.5 (38)
	100.0	100.0	100.0	100.0
Condom negotiation self-efficacy, mean (SE)	4.45 (0.03)	4.46 (0.01)	4.54 (0.02)	4.55 (0.02)

Table 8. Mediation analysis

	Sexual Health Outcomes			
	Adolescents		Young adults	
	CNSE Estimate (95% CI)[a]		CNSE Estimate (95% CI)[a]	
Model 1: Partner violence predicting CNSE Partner violence	**-0.204 (-0.265, -0.143)*** **		**-0.157 (-0.211, -0.104)*** **	
	Unintended pregnancy AOR (95% CI)[a]	STI diagnosis AOR (95% CI)[a]	Unintended pregnancy AOR (95% CI)[a]	STI diagnosis AOR (95% CI)[a]
Model 2: Partner violence predicting outcome				
Partner violence	**1.05 (1.00 - 1.10)***	**1.06 (1.03 - 1.08)*** **	**1.05 (1.00 - 1.09)***	**1.05 (1.03 - 1.07)*** **
Model 3: Partner violence and CNSE predicting outcome				
Partner violence	**1.04 (0.99 - 1.09)**	**1.05 (1.03 - 1.08)*** **	1.03 (0.99 - 1.08)	**1.05 (1.02 - 1.07)*** **
CNSE	**0.96 (0.93 - 0.99)***	0.99 (0.98 - 1.01)	**0.95 (0.93 - 0.98)****	0.99 (0.98 – 1.00)
Mediation Analysis				
Indirect effect, (SE)	**0.004 (0.002)***	0.001 (0.001)	**0.004 (0.001)****	0.001 (0.001)
Percent of total effect that is mediated, %	18.9%	3.2%	24.8%	4.6%

[a] All models adjusted for race/ethnicity and intervention status

*p<.05. **p<.01. ***p<.001.

6. MANUSCRIPT 2: MALE PARTNER INFLUENCE ON ADOLESCENT AND YOUNG ADULT CONTRACEPTIVE USE

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6.1 ABSTRACT

Objective: To assess partner influence on contraceptive use in a nationally representative sample of U.S. adolescent and young adult women.

Study Design: We examined data from 2,541 sexually active women (ages 15-19, n=972; ages 20-24 years, n=1,569) (U.S. National Survey of Family Growth). Lifetime experiences of male partner influences (partner influence of contraception termination, partner wants a child and woman does not) were assessed as the main predictors. Primary outcomes were current and past-year use of female-controlled contraceptives (FCC) (oral contraception, intrauterine devices, implants, injectables, patches, and rings) as well as past-year FCC nonuse, number of methods used, and discontinuation. Generalized estimating equations were used to estimate prevalence ratios (current FCC use) and risk ratios (past-year nonuse, number of methods, and discontinuation associated with partner influence.

Results: Two in 5 adolescents (42.6%) and half of adult women were currently using an FCC. Partner influence was associated with greater FCC use in young adults (prevalence ratio = 1.24, 95% CI 1.19-1.30) but adolescence moderated this effect (interaction term PR=0.66 [0.53-0.84]). Adolescents had used and discontinued more FCC methods in the past year as compared to young adults, regardless of partner influence (risk ratio = 1.29 [1.07-1.57] and RR=1.88 [1.44-2.44], respectively).

Conclusions: Partner influence may be related to current and past contraceptive use. In particular, partner influence is associated with suboptimal current and past-year contraceptive use among adolescents. Clinicians should directly discuss partner influences on contraceptive use

and address barriers, including partners' interference with and influence over contraceptive decision making. Offering a range of method options that partners are least likely to interfere with will support autonomy in vulnerable populations.

6.2 BACKGROUND

Of the sexually experienced women in the U.S., almost all (99%) have used some type of contraception at least once.[58] However, lapses in contraceptive use are common. Nationally, 11.0% of women 15-44 years old at risk for unintended pregnancy reported not currently using any method.[58] Adolescent and young adult women are particularly likely to go without contraception; 14.8% of 15-19 year olds and 18.0% of 20-24 year olds report not currently using any method.[58] Thus, nearly all sexually-experienced women have used some form of contraception, but lapses in coverage are common among adolescent girls and young adults, leaving a substantial minority of them at risk of unintended pregnancy.

Among 15-24 year old women who do use contraception, a large proportion choose less effective methods. From national data, 29.4% report relying on condoms only and 49.5% use oral contraceptives (birth control pills) as their most effective forms of contraception.[58] These methods are associated with 18% and 9% failure rates in the first year of typical use, respectively.[116] A compounding problem with contraceptive nonuse is that even after a female starts a given method, chances of discontinuation or suboptimal compliant use are high. During a one-year study in which 16-24 year old women started or switched to oral contraception, only 35% reported that they were still using oral contraception at the twelve-month follow-up and 30% were not using any contraception[66]; perceived risk for pregnancy was not associated with continued contraceptive use at follow-up.[66] Another study found that 15.9% of 15-19 year olds and 16.4% of 20-24 year olds who had ever used a contraceptive were currently sporadic users.[117] Therefore, most adolescent and young adult women who do use contraception rely on

less effective methods and a significant proportion of them discontinue or use these methods inconsistently.

Given these patterns, there has been considerable effort to identify factors related to contraceptive nonuse, discontinuation, and less effective use. Relationship and partner characteristics that appear to influence contraceptive use range from length of time and living situation with a current partner[118-120] to severe partner abuse – including physical and sexual intimate partner violence[21,41,71,121] and reproductive coercion [121](male partner attempts to impregnate a female against her wishes or to control the outcome of a pregnancy[3]). Factors associated with poor contraceptive use include relationship conflict,[119,122,123] perceptions that a partner does not want to use contraception,[124] believing that unprotected sex has partner benefits (e.g., is a sign of love),[123,124] power differences within the relationship,[125] and comparatively older partners.[126] Conversely, factors that are associated with better contraceptive use include relationship intimacy,[122,127] greater commitment to a partner,[122] communicating with a sexual partner about contraception,[107,127-130] shared sexual decision-making,[131] partner involvement in contraceptive choice and use,[131] and perception that the partner wants to use condoms or other contraception.[130,132,133] Overall, this research indicates that open communication, mutual positive attitudes towards contraceptive use, and power-equitable relationships contribute to a woman's consistent contraceptive use.

The body of work to date on relationship dynamics associated with contraceptive methods, non-use, and discontinuation of use has several limitations. Studies have largely assessed contraceptive use at last intercourse or within a single short period of time (e.g., thirty days) or measure contraceptive use as condom use alone or in conjunction with other methods ("any contraceptive use"). Defining partner influence on contraceptive use over time as opposed

to during a single time point should provide a better classified predictor in models of unintended pregnancy. Further, female controlled contraception (FCC; non-condom, non-barrier contraceptives, including intrauterine devices (IUDs), hormonal implants, injectables, oral contraceptives, hormonal patches, and intravaginal rings) provide options for women that are largely under their own control and do not require partner knowledge or cooperation. FCCs (especially longer activing reversible contraceptives) offer women greater reproductive autonomy when faced with more severe forms of partner influence, including intimate partner violence and reproductive coercion (pregnancy coercion, birth control sabotage, and interference with contraceptive use[7,11,41]) .Therefore, this current study aims to assess partner influences' on FCC over a twelve month period to elucidate such influence might impact unintended pregnancy risk.

For this study, we hypothesize that women who report partner influence on contraception will be less likely to currently use an FCC method, report more months of FCC nonuse, use more types of FCC methods, and discontinue more types of FCC methods in the past year compared to women who do not report partners influencing their contraceptive decision-making.

6.3 METHODS

6.3.1 Study design and sample

We utilized National Survey of Family Growth (NSFG) data from the 2006-2010 cycle. The NSFG is a nationally representative survey on reproductive health topics conducted regularly in the United States. Details on the sampling frame and survey items have been previously published.[134,135] Briefly, 12,279 women and 10,403 men between the ages of 15-44 years were

interviewed in person from June 2006 to July 2010. Strata and cluster identification account for the sampling design and weighting is used to account for nonresponse and oversampling of pre-specified subgroups.

The focus group of this study is adolescent and young adult women (ages 15-24) who reported any history of heterosexual sex and are capable of becoming pregnant. Of the 4,382 age-eligible women, those who never had sex with a male (n=1,462), were currently pregnant (n= 201), immediately postpartum (n=51), were trying to become pregnant (n=85), or reported that they were sterile (n=42), were excluded. The remaining sample was 2,541 women eligible for analysis (ages 15-19 years, n=972; ages 20-24 years, n=1,569). Given that the different determinant variables were asked of only certain groups (described below), sample size varied by the predictor assessed.

6.3.2 Key measures

Partner influence was identified in two distinct manners. Women who reported ever having stopped using oral contraceptives, condoms, the Depo-Provera or Lunelle injectable, or contraceptive patch due to dissatisfaction were queried for discontinuation reasons (n=861). Those who selected 'my partner did not like it' were identified as positive for *partner influenced contraception termination*. Women who were married or cohabitating reported their perception of their partner's desire for (a/nother) child (n=615). Women who reported that they do not want or were unsure about wanting (a/nother) child but that their partner did want (a/nother) child were identified as positive for *discordant pregnancy intentions.*

Complete contraceptive use histories for the three to four years prior to the survey interview were collected on a month-by-month basis. However, this current analysis is restricted to contraceptive use in the past year. Per NSFG guidelines,[135] the most effective method reported

in a month is identified as the primary method. For all outcomes, female-controlled contraception (FCC) was defined as reporting use of the following methods: 'birth control pills,' 'Depo-Provera, injectables,' 'hormonal implant (Norplant or Implanon),' 'IUD, coil, or loop,' 'emergency contraception,' 'Lunelle injectable (monthly shot),' 'contraceptive patch,' or 'vaginal contraceptive ring.' Women who were using any of the FCC methods during the month of the interview were coded as positive for *current use of FCC. Past-year months of FCC nonuse* was calculated by summing the number of months in which the participant did not report using at least one FCC in the past twelve months. *Past-year number of FCC methods used* was calculated by summing the FCC method types that participants reported using in the past twelve months. *Past-year FCC discontinuation* was calculated by assessing the number of methods used that were reported in the past year that were not being used in the month of interview (e.g., a woman who only used oral contraceptives in the past year but was not using them during the month of interview was identified as discontinuing one FCC method).

Variables that were considered as covariates were respondent's race/ethnicity, household income relative to the poverty level, and gravidity.

6.3.3 Analysis

Demographic and sexual/reproductive history characteristics were assessed. The number of women who were asked and endorsed each of the partner influence characteristics were identified and reported. Contraceptive use at the beginning of the time period (12 months prior to interview) and at the time of the interview were assessed using the most effective method in the month and reported here separately for adolescents (15-19 years) and young adults (20-24 years).

Generalized estimating equation (GEE) models that accounted for survey design were used to assess partner influence, adolescent age group, and the interaction between partner

influence and age on FCC use outcomes. Due to the high prevalence of current FCC use, a log-binomial GEE model[136] was used to estimate the prevalence ratios associated with partner influence. Past-year FCC use outcomes were assessed using GEE models with Poisson distributions. To account for differential time at risk for those women who had sexual intercourse for the first time within the past year, the number of months between the first sexual intercourse and the date of the survey was calculated ("time active") and top-coded at 12 months (eligible for entire time period). For past-year months of FCC nonuse, this value was used as an offset term to identify the time period at risk (0-12 months). For past-year number of FCC methods used and past-year FCC discontinuation, this time active term was categorized as 0-5 months, 6-11 months, and 12 or more months and included as a covariate. Race/ethnicity, poverty level, and gravidity were also included as covariates in all models.

All analyses accounted for the multi-level survey design with respondent weighting using SAS v9.4.[96] All percentages presented are weighted per NSFG recommendations.[134,135] Significance was set at alpha=0.05.

6.4 RESULTS

6.4.1 Participant characteristics

Of the women who were eligible for the present analysis, 35.5% were 15-19 years old and 64.5% were 20-24 years old (Table 9). A majority of women (59.4%) identified as non-Hispanic White, with the remaining identifying as non-Hispanic Black (14.3%), Hispanic (16.6%), and non-Hispanic other or multiracial (9.7%). Half (51.0%) were currently attending school and 22.6%

lived with both biological parents. Over a quarter of the women (27.9%) reported household incomes below the poverty line. Most women had no history of pregnancy (68.2%).

6.4.2 Partner influence characteristics

Of the 861 women who reported having ever stopped using oral contraceptives, condoms, Depo-Provera or Lunelle injectable, or the contraceptive patch due to dissatisfaction, 60 (6.9%) reported that their partners did not like that method (adolescents: 6.9%, young adults: 6.9%; Table 10). Of the 615 women who reported their married or cohabitating partner's pregnancy intentions, 33 (4.0%) reported that while the women did not want (a/nother) child, their partner did (7.6% and 3.4% of adolescents and young adults, respectively).

6.4.3 Contraceptive use

Twelve months prior to the interview, 1 in 3 adolescents (31.5%) and 1 in 4 young adults (26.4%) were not using any contraceptive method to prevent pregnancy, while 1 in 4 adolescents (24.2%) and 1 in 5 young adults (19.5%) relied on condoms for pregnancy prevention (Table 11). Of the FCC, oral contraception was most commonly reported (26.7% of adolescents and 37.0% of young adults). Adolescents also reported using the Depo-Provera injectable (7.9%), but no other FCC methods were endorsed by at least 5% of adolescents or young adult women. Of the non-condom and non-FCC methods available, withdrawal was reported by 1 in 20 women (4.4% and 6.1% for adolescents and young adults, respectively), but other methods were rarely used as the primary contraceptive.

At the time of the interview, 35.0% of adolescents and 23.2% of young adult women were currently not using anything to prevent pregnancy, while 17.7% and 22.2%, respectively, were using condoms. Of the FCC, oral contraception was the primary method (28.7% and 35.4%

for adolescents and young adults, respectively), with the Depo-Provera injectable for adolescents (7.5%) being the only other FCC method reported by more than 5% of the sample. Withdrawal was endorsed by 1 in 20 women (6.0% and 5.4% for adolescent and young adults, respectively).

6.4.4 Partner influence and contraceptive use

Current FCC use was reported by 42.6% of adolescents and 49.9% of young adult women (Table 12). Adolescents reported more months of past-year FCC nonuse compared to young adult women (7.4 months versus 6.2 months, respectively). Of the adolescent women, 24.0% reported no months of FCC use and 43.4% reported using an FCC every month in the past year. One in three young adult women (35.1%) did not report any FCC methods, while 38.6% reported using an FCC every month in the past year.

The total number of FCC methods used in the past year was similar for the age groups and averaged 0.67 methods; 40.1% of women used no FCC methods in the past year, while 6.8% used two or three methods. The number of FCC methods discontinued was also similar for the age groups and averaged 0.18 methods, with the vast majority (83.5%) not discontinuing any FCC methods.

Current FCC use. Current FCC use was more prevalent among women who reported partner influence on contraception termination compared to those who did not report this influence (adjusted prevalence ratio=1.24, 95% CI 1.19-1.30). There was no main effect of age group, but there was a significant interaction between partner influence and adolescence, such that current FCC use was less prevalent among adolescents reporting partner influence (PR_{adj}=0.66 [0.53-0.83]). Current FCC use was less prevalent among Black women compared to White (PR_{adj}=0.79 [0.73-0.84]), with no other racial differences.

Current FCC use was not more prevalent among those reporting discordant pregnancy intentions with partner (PR_{adj}=1.14 [0.97-1.35]) or adolescence (PR_{adj}=0.91 [0.75-1.12]). The interaction term was omitted due to model nonconvergence.

Past-year months of FCC nonuse. The main effects of partner influence on contraception termination and adolescence main effects were not significantly associated with past-year months of FCC nonuse. However, an interaction between the two terms indicated a marginally higher risk for FCC nonuse among adolescents reporting partner influence (RR_{adj}=1.49 [0.93-2.37]). Black race was also associated with higher risk for FCC nonuse (RR_{adj}=1.58 [1.33-1.88]).

Discordant pregnancy intentions with partner, adolescence, and the interaction term were not associated with past-year months of FCC nonuse. Black race was the only significant predictor of FCC nonuse in this model (RR_{adj}=1.25 [1.05-1.48]).

Past-year number of FCC methods used. In models assessing past-year number of FCC methods, partner influence on contraception termination (RR_{adj}=1.26 [1.16-1.38]) and adolescence (RR_{adj}=1.29 [1.07-1.57]) were associated with greater number of methods, but there was no significant interaction between the two terms. Black race was associated with fewer FCC methods (RR_{adj}=0.54 [0.48-0.62]).

Discordant pregnancy intentions with partner were marginally associated with more FCC methods (RR_{adj}=1.24 [0.98-1.55]), but adolescence and adolescents experiencing partner influence were not. Black and Multiracial or Other races reported fewer FCC methods (RR_{adj}=0.76 [0.59-0.99] and RR_{adj}=0.73 [0.62-0.85], respectively), while those of Hispanic ethnicity reported more methods (RR_{adj}=1.25 [1.08-1.43]).

Past-year number of FCC methods discontinued. Models for past-year FCC discontinuation showed no significant relationship with partner influence on contraception

termination, but there was a significant relationship between adolescence and FCC discontinuation (RR_{adj}=1.88 [1.44-2.44]). There was no significant interaction between these two terms (RR_{adj}=0.76 [0.28-2.06]). Women identifying as Black discontinued fewer FCC methods (RR_{adj}=0.56 [0.44-0.72]).

Discordant pregnancy intentions, adolescence, and the interaction term between the two were not associated with the number of FCC methods discontinued. Black women reported fewer methods discontinued (RR_{adj}=0.55 [0.37-0.83]), while Hispanic women reported discontinuing more FCC methods (RR_{adj}=2.02 [1.41-2.90]).

6.5 DISCUSSION

The present study uses nationally representative data to assess partner influence on adolescent and young adult women's contraceptive habits over time, particularly methods that are under greater female control. Findings indicate that, contrary to our hypothesis regarding current use of FCC, past partner influence on contraception termination was significantly associated with greater current use of FCC. It was also associated with past-year number of FCC methods, as hypothesized. Adolescents, including those with and without experiences of partner influence, were less likely to be currently using a method and had more method switching overall.

Adolescent and young adult women from minority racial and ethnic groups reported less optimal contraceptive behaviors compared to White peers. Young Black women had less current FCC use, more months of nonuse, and fewer methods used overall in the past year, while Hispanic women used and discontinued more FCC methods in the past year. These findings persisted despite controlling for poverty status and are consistent with other studies conducted in

the U.S. that show racial and ethnic disparities in contraceptive use. For example, one study showed that of women who did not want any (more) children, those who identified as a racial minority were over half as likely to not use contraceptive at last intercourse compared to non-Hispanic White women, after accounting for demographic, socioeconomic, reproductive characteristics, and healthcare access and utilization.[137] Another study on women 18-29 years of age found that almost half of Black women (45%) and over one-third of Hispanic women (38%) were not currently using a contraceptive method, compared to one-quarter (24%) of White women.[138] Further, of those women who were using contraception, use of oral contraception or other hormonal methods was lower among Black (29%) and Hispanic (30%) women compared to White women (59%).[138] The associations between race and ethnicity with contraceptive use were not mediated by differences in attitudes on contraception, pregnancy, fertility, and childbearing across race after adjusting for participant characteristics.[138] Given that neither access nor knowledge and attitudes can explain these disparities in contraceptive use and thus unintended pregnancy risk, public health programs must go beyond these first-tier factors and explore the greater context in which young women are making these contraceptive decisions and facing possible barriers to use – such as partner violence and coercion.

Overall, these adolescent and young adult women, when using contraception at all, primarily rely on condoms and oral contraception for pregnancy prevention. Other FCC, particularly long acting reversible contraception (LARC) such as the IUD and hormonal implant, are vastly underutilized in this population, thus exposing younger women to risk for unintended pregnancy. Oral contraceptive use is the major component of the relatively high FCC prevalence (48.0% overall), but there are dramatic differences in usage patterns. The present data suggest that there are primarily two categories of users: those who always use an FCC and those who do

not use FCC at all. While we do not know the consistency and reliability of use for the consistent users (i.e., “perfect use” versus “typical use”), it appears that the greatest need is for women who never use FCC to be targeted for contraceptive counseling, to facilitate their transition to FCC use.

For the purposes of this work, we grouped the various female-controlled methods of contraception together. However, qualitative work indicates that there are actually varying degrees of control across methods. For example, oral contraceptive use can be sabotaged through destroying the pills (e.g., washing them down sink) or preventing a woman from going to the clinic or pharmacy to pick up the pills.[3,97,98] IUD use, on the other hand, can be made “invisible” by cutting strings, providing years of protection from pregnancy without a partner’s knowledge. In addition to varying levels of control, different contraceptive methods are not equally effective. Of women with “typical use” of oral contraceptives, 9% on average will become pregnant within the first year; of the two IUD types assessed, 0.2-0.8% of women on average experience a pregnancy that first year.[116] Thus, women may choose (or be counseled on) the methods that offer the greatest protection with least vulnerability to partner influence or tampering. Encouragingly, a study found that after providing adolescent females with information on these methods (such as LARC) and the option to choose a method at no cost, 72% of the adolescent girls chose a LARC method.[139] Thus, we would expect favorable results with increased education about these options for young patients.

There are several limitations to this study. We combined contraceptive methods with varying levels of control, invisibility, and effectiveness into a collective “FCC use.” However, as our hypothesis is that women experiencing partner influence will try a number of different methods to find the right balance of their lives, the grouping of these female-controlled methods

is appropriate. These data are self-reported by women at a single point in time; thus, recall bias is possible when considering reports for contraceptive use up to four years prior to the interview. To address this issue, contraceptive data were restricted to the twelve months prior to the interview. Additionally, the NSFG provides nationally representative data; as most studies on unintended pregnancy and partner violence are conducted in family planning or obstetrician/gynecology offices, use of these data are an important move forward in this field. Finally, the items selected to represent partner influence were not asked of all respondents, but rather were contingent on other conditions (e.g., had to be married or cohabitating to be asked about their perceptions of their partners' pregnancy intentions). However, the items used may represent subtler partner behaviors that ultimately influence contraceptive use.

The present study assessed current contraceptive use and partner influence on female controlled contraception – contraception that can be used without a male partner's explicit knowledge and cooperation. Almost half of adolescent and young adult women currently use these female controlled methods, but few are choosing the LARC methods that are most effective at protecting against pregnancy. Young adult women may be using female controlled contraception to cope with past partner influence, but adolescent women reporting partner influence had worse contraceptive use. Future work should focus on those groups vulnerable to partner violence and influence, such as family planning clinic patients, racial/ethnic minorities, those of low socioeconomic status, and, as illustrated in this study, adolescent girls.

6.6 TABLES

Table 9. Participant characteristics

Characteristic	Total Sample (n=2,552) Weighted % [a]
Demographics	
Age Group	
15-17 years	12.7
18-19 years	22.8
20-22 years	37.2
23-24 years	27.2
Race/ethnicity	
Non-Hispanic White	59.4
Non-Hispanic Black	14.3
Non-Hispanic Other or Multiracial	9.7
Hispanic	16.6
Born in the U.S.	
Yes	90.7
No	9.3
Currently in school	
Yes	51.0
No	49.0
Currently living with both biological parents	
Yes	22.6
No	77.4
Household poverty level	
0-99%	27.9
100-199%	26.1
200-299%	18.1
≥ 300%	28.0
Went without health insurance coverage at all in past year	
Yes	31.2
No	68.8
Sexual and reproductive history	
Gravidity	
None	68.2
One	17.5
Two or more	14.3

Table 9 Continued

Lifetime number of male sexual partners	
One	28.9
Two or three	26.9
Four to six	24.2
Seven or more	20.0

[a] Percentages are weighted to account for survey sampling design

Table 10. Partner influence characteristics

Determinants	Qualification	Number Eligible	Number Endorsed % of those eligible [a]
Partner influenced contraception termination	Respondents who reported ever having stopped using oral contraceptives, condoms, the Depo-Provera or Lunelle injectable, or contraceptive patch due to dissatisfaction	861	60 (6.9%)
Adolescents		252	16 (6.9%)
Young adults		609	44 (6.9%)
Discordant pregnancy intentions with partner	Respondents who were married or cohabitating with their partner	615	33 (4.0%)
Adolescents		107	6 (7.6%)
Young adults		508	27 (3.4%)

[a] Percentages are weighted to account for survey sampling design

Table 11. Most effective contraceptive women reported using twelve months prior to interview and month of interview

Contraceptive methods[a]	Adolescents (15-19 years)		Young adults (20-24 years)	
	Twelve months prior to interview % (95% CI)[b]	Month of interview % (95% CI)[b]	Twelve months prior to interview % (95% CI)[b]	Month of interview % (95% CI)[b]
No method used	31.5 (26.5, 36.4)	35.0 (31.1, 38.9)	26.4 (22.8, 30.0)	23.2 (20.1, 26.3)
Condom	24.2 (19.7, 28.7)	17.7 (14.4, 21.0)	19.5 (16.6, 22.4)	22.2 (19.3, 25.1)
Female Controlled Contraception				
Birth control pills	26.7 (21.9, 31.5)	28.7 (24.7, 32.7)	37.0 (32.9, 41.1)	35.4 (31.5, 39.4)
Depo-Provera, injectables	7.9 (4.9, 10.9)	7.3 (5.1, 9.4)	4.6 (3.2, 6.0)	4.0 (2.5, 5.4)
Hormonal implant (Norplant or Implanon)	0.35 (0.00, 0.82)	0.26 (0.00, 0.60)	0.49 (0.00, 1.00)	0.65 (0.07, 1.2)
IUD, coil, or loop	0.98 (0.05, 1.9)	1.8 (0.58, 3.1)	2.3 (1.3, 3.3)	4.5 (3.1, 5.9)
Lunelle injectable (monthly shot)	0 (0)	0 (0)	0 (0)	0.27 (0.00, 0.65)
Contraceptive patch	1.6 (0.54, 2.6)	1.4 (0.28, 2.4)	0.73 (0.28, 1.2)	0.42 (0.14, 0.70)
Vaginal contraceptive ring	1.8 (0.35, 3.3)	1.7 (0.43, 2.9)	1.8 (0.92, 2.8)	3.0 (1.8, 4.3)
Other				
Withdrawal, pulling out	4.4 (2.2, 6.6)	6.0 (3.5, 8.5)	6.1 (4.3, 8.0)	5.4 (3.9, 7.0)

[a] The following methods were not listed because they were endorsed by less than 1% of women at both timepoints and were not one of the pre-specified FCC methods of interest: safe period by temperature of cervical mucus test, diaphragm, foam, jelly or cream, suppository insert, partner was sterile but not from a vasectomy, rhythm or safe period by calendar, female condom or vaginal pouch, emergency contraception, partner's vasectomy, and other method

[b] Percentages are weighted to account for survey sampling design

Table 12. Associations of male partner influence with contraceptive use

	Current FCC use	Past-year FCC use		
	Current FCC use % (95% CI)[a]	Months of FCC nonuse Mean (95% CI)[a]	Number of FCC methods Mean (95% CI)[a]	FCC discontinuation Mean (95% CI)[a]
Total	47.3 (44.4-50.2)	6.6 (6.2-7.0)	0.67 (0.63-0.71)	0.18 (0.15-0.20)
Adolescents (15-19 years)	42.6 (37.8-47.3)	7.4 (6.9-7.9)	0.64 (0.59-0.70)	0.20 (0.16-0.23)
Young adults (20-24 years)	49.9 (46.5-53.4)	6.2 (5.7-6.6)	0.68 (0.64-0.73)	0.17 (0.14-0.19)
	Prevalence Ratio (95% CI)	Risk Ratio (95% CI)	Risk Ratio (95% CI)	Risk Ratio (95% CI)
Model 1: Partner influenced contraception termination				
Partner influence	**1.24 (1.19-1.30)**	0.87 (0.57-1.32)	**1.26 (1.16-1.38)**	1.16 (0.91-1.46)
Adolescence	1.02 (0.91-1.15)	1.01 (0.85-1.20)	**1.29 (1.07-1.57)**	**1.88 (1.44-2.44)**
Partner influence * Adolescence	0.66 (0.53-0.83)	1.49 (0.93-2.37)	0.60 (0.23-1.59)	0.76 (0.28-2.06)
Race/ethnicity				
White	---Reference Group---	---Reference Group---	---Reference Group---	---Reference Group---
Black	**0.79 (0.73-0.84)**	**1.58 (1.33-1.88)**	**0.54 (0.48-0.62)**	**0.56 (0.44-0.72)**
Hispanic	1.02 (0.94-1.10)	1.18 (0.95-1.46)	1.06 (0.95-1.19)	1.02 (0.76-1.36)
Multiracial and Other	0.85 (0.69-1.05)	1.35 (0.94-1.94)	0.78 (0.58-1.06)	0.97 (0.71-1.33)
Household income below the poverty level	0.98 (0.87-1.11)	1.00 (0.88-1.13)	1.07 (0.97-1.18)	**1.27 (1.07-1.51)**
History of pregnancy	1.05 (0.94-1.16)	1.04 (0.86-1.24)	1.00 (0.90-1.08)	0.83 (0.64-1.09)
Time since first intercourse				
0-5 months	1.02 (0.60-1.74)	N/A[b]	**1.34 (1.06-1.69)**	1.74 (1.08-2.83)
6-11 months	**1.22 (1.12-1.33)**	N/A [b]	**1.82 (1.41-2.35)**	2.27 (1.36-3.81)
12 months or more	---Reference Group---	---Reference Group---	---Reference Group---	---Reference Group---
Model 2: Discordant pregnancy intentions				
Partner influence	1.14 (0.97-1.35)	0.96 (0.73-1.28)	1.24 (0.98-1.55)	1.72 (0.71-4.16)

Table 12 Continued

Adolescent	0.91 (0.75-1.12)	1.17 (0.80-1.72)	1.04 (0.76-1.41)	1.51 (0.998-2.29)
Partner influence * Adolescent	N/A[c]	1.29 (0.76-2.19)	1.14 (0.73-1.78)	0.33 (0.02-4.43)
Race/ethnicity				
White	---Reference Group---	---Reference Group---	---Reference Group---	---Reference Group---
Black	0.87 (0.75-1.01)	**1.25 (1.05-1.48)**	**0.76 (0.59-0.99)**	**0.55 (0.37-0.83)**
Hispanic	1.04 (0.96-1.13)	1.00 (0.84-1.18)	**1.25 (1.08-1.43)**	**2.02 (1.41-2.90)**
Multiracial and Other	0.88 (0.75-1.01)	1.22 (0.93-1.59)	**0.73 (0.62-0.85)**	0.52 (0.17-1.57)
Household income below the poverty level	**1.08 (1.06-1.10)**	0.94 (0.86-1.04)	1.10 (0.98-1.24)	0.92 (0.49-1.74)
History of pregnancy	0.95 (0.81-1.12)	1.23 (0.99-1.54)	0.87 (0.75-1.01)	0.74 (0.51-1.08)
Time since first intercourse				
0-5 months	**1.36 (1.22-1.52)**	N/A [b]	**1.30 (1.23-1.37)**	0.72 (0.20-2.62)
6-11 months	0.87 (0.65-1.17)	N/A[b]	0.95 (0.49-1.84)	1.00 (0.26-3.87)
12 months or more	---Reference Group---	---Reference Group---	---Reference Group---	---Reference Group---

[a] Percentages are weighted to account for survey sampling design

[b] Not applicable because time since first intercourse was used as an offset term in this model

[c] The interaction term had to be excluded from this model due to nonconvergence.

7. MANUSCRIPT 3: CONCORDANCE OF SEXUAL HEALTH DATA BETWEEN SELF-REPORT AND MEDICAL RECORDS AMONG ADOLESCENT AND YOUNG ADULT WOMEN: THE ROLE OF PARTNER VIOLENCE AND RELATED FACTORS

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7.1 ABSTRACT

Objective: To assess concordance of self-report and medical record data for sexually transmitted infections (STI) and pregnancy, and factors associated with discordant reporting.

Methods: Young women (16-24 years, n=2,203) reported on recent STI, past-year pregnancy, intimate partner violence (IPV), and reproductive coercion (RC) in a family planning clinic survey and granted access to their medical records. We evaluated the overlap of case ascertainment by data source and constructed multinomial mixed models to identify factors associated with discordant reporting.

Results: STI were more likely to be self-reported but not found in the medical record among African-American women compared to White women (AOR=3.01, 95% CI 2.01-4.50) and women who reported recent IPV or RC, compared to women without these experiences (AOR=1.82 [1.16-2.87] and AOR=2.82 [1.74-4.59], respectively). This same pattern was observed for pregnancy for African American women (AOR=1.84 [1.22-2.77]), women who experienced IPV (AOR=1.85 [1.39-2.46]) or RC (AOR=2.22 [1.57-3.13]), and women who were intending future pregnancy at baseline (AOR=2.10 [1.37-3.21]).

Conclusions: Self-report detected more cases of STI and pregnancy compared to medical record data. Factors associated with discordant reporting may lead to underestimation of these sexual health outcomes. Using multiple follow-up surveys with shorter recall periods to events may provide more accurate information.

7.2 BACKGROUND

Sexually transmitted infections (STI) and unintended pregnancy are widespread public health problems, particularly for adolescent and young adult women.[34,140] While a substantial body of research has led to effective interventions to reduce STI and unintended pregnancy in this population, the optimal methods for measuring these sexual and reproductive health outcomes remain controversial. While biological samples are the gold standard, where resources are limited, researchers rely on medical records as well as self-reports on surveys. Research indicates there are considerable discrepancies in self-reports over time and in self-reports compared to medical record data,[75,76,141] creating the potential for biased results.

Several studies have found that, specifically for adolescents, sexual health information such as STI is underreported with self-report on a survey compared to medical records and in-person interviews, which are typically conducted in adolescent health clinics or as part of national surveys.[75,76] One study found that although self-reported data resulted in lower prevalence estimates of chlamydia and gonorrhea compared to composites from medical records and health department reports, the kappa scores of agreement were within an acceptable range (0.67 to 0.80).[141] Discordance in reporting could go both ways – reported by self-report and not in the medical record or in the medical record but not reported on a survey. Understanding the extent of this discordance and any potential predictors of such discordance in reporting is needed to improve the methodologic rigor of adolescent and young adult sexual health research.

While collecting biological samples for STI and pregnancy testing are certainly the gold standard for measuring sexual health outcomes, many clinic studies rely on self-report on

surveys as well as secondary data from clinic and health department records. As extracting medical record data can be expensive and time consuming, estimating the extent of discordance between self-report and medical record information would be helpful to guide sexual health researchers on the value of adding chart extraction to a study. Similarly, identifying factors associated with discordant reporting may also highlight potential underestimation and biases.

Past research has identified several demographic factors associated with discordant reporting. Discordant reporting is more likely among younger adolescents compared to older adolescents for sexual behaviors such as occurrence and age of first vaginal sex.[77,142,143] In one study, survey respondents were asked "How honest were you in what you said about your sexual behavior?"; fewer middle school girls reported that their answers were 'just as much as I have' compared to high school girls (70.3% vs. 82.8%, $p \leq .001$),[144] indicating that developmental stage and age differences should be considered when assessing adolescent reporting of health behaviors . Longitudinal studies that use self-report at multiple timepoints have shown that among adolescents and young adults, African-American females have higher odds of rescinding reports of engaging in sexual intercourse[142] and, along with Hispanic females, lower adjusted odds of consistently reporting age at first sex[143] compared to their White peers. Finally, since unintended pregnancy is associated with public insurance or no insurance compared to private insurance,[145,146] we could expect differences in reporting by clinic funding (e.g., accepts patients with public insurance or provides low-cost healthcare for the uninsured).

Demographic factors alone, however, do not fully account for discordant reporting and variations in discordant reporting across groups of adolescents. Family planning clinic clients represent a particularly vulnerable group of adolescent and young adults. No studies have examined the extend of discordant reporting between self-report on self-administered surveys

and medical record data among this clinic population at elevated risk for STI and unintended pregnancy. Free-standing family planning clinics tend to serve younger women who do not have a consistent medical home and women who are seeking confidential services for a variety of reasons, often in socially disadvantaged communities. Not only is the prevalence of STI and unintended pregnancy higher in this population than in the general population, women seeking care in family planning clinic settings tend to be younger and to report higher prevalence of intimate partner violence (IPV) and reproductive coercion (RC; a male partner's attempts to impregnate a female against her wishes or control the outcome of a pregnancy).[7,8,10,11,147] Of particular interest in terms of discordance in sexual health outcome reporting is the possible role of IPV and RC. IPV and RC have been shown to be associated with STI[47-49,148] and unintended pregnancy[7,11,37,41,148] as well as greater healthcare seeking, including for STI testing, pregnancy testing, and emergency contraception.[10,147,149,150] As IPV is often not disclosed to healthcare providers because of fear, not feeling ready to disclose (i.e. haven't reached the "turning point"[151]), shame and embarrassment, seeing the violence as a personal issue, and fear of their children being removed,[152-154] health outcomes associated with or a direct result of abuse may similarly not be disclosed via self-report. If that is the case, studies that utilize self-reported data only for STI or pregnancy may underestimate the associations with abuse. Conversely, if patients are accessing healthcare at multiple places, medical record data accessed at one organization or facility may be incomplete. These and related factors may contribute to discordant reporting in the family planning clinic population, which have not been explored in the adolescent sexual and reproductive health literature to date.

We first assessed the concordance between self-report and medical record data for STI and pregnancy diagnoses over a 24 month period in adolescent and young adult women attending

family planning clinics. We then determined whether age differences (adolescent versus young adult), race/ethnicity, or pregnancy intention predicted discordant reporting. Finally, we assessed whether IPV and RC are associated with discordant reporting of STI and pregnancy.

7.3 METHODS

7.3.1 Study design and sample

The present study uses data that were collected as part of a large cluster randomized controlled trial in family planning clinic settings (R01HD064407: Miller & Silverman), designed to test a clinician-delivered brief intervention to reduce RC/IPV and associated negative health consequences. The study protocol is described in detail elsewhere.[109] Briefly, this study was conducted in 24 Western Pennsylvanian family planning clinics and enrolled women 16-29 years of age. Women at the clinic for care were approached by research staff when they arrived. Interested women were consented and completed the baseline survey in a private area of the clinic. Parental consent was waived for minors, as they were receiving confidential services. Participants were asked to sign medical record authorization forms to allow the study team to abstract their medical record data, but this authorization was not required for study participation. A total of 3,687 women enrolled at baseline (of which 2,697 were ages 16-24).

Surveys were conducted at baseline, four months, and twelve months, using a laptop computer in the clinic with ACASI software. For follow-up surveys only, participants could also complete the surveys via telephone (all ages) or online (18 years and older). Trained research assistants abstracted medical record data from one year prior to study enrollment through 18 months post-enrollment, for thirty months total. A detailed protocol was developed to ensure

uniform abstraction and weekly quality checks were conducted. A total of 3,590 records (97% of baseline sample) were abstracted. The University of Pittsburgh Institutional Review Board approved all study procedures. A federal Certificate of Confidentiality was obtained to protect participant confidentiality.

Participants from the parent study were excluded from the present analysis for the following criteria: being 25 or older (n=990), not ever having sex or only having sex with women (baseline, n=125; four-month follow-up, n=99; twelve-month follow-up, n=82), not having sex in the past three months (n=209, n=752, and n=210, respectively), missing information on key survey measures for the present study (n=99, n=100, and n=162, respectively), and missing medical record data (n=61, n=17, and n=198, respectively). These exclusions were made on a by-timepoint basis, such that women who had to be excluded at one visit would remain in the sample for the other timepoints for which they were eligible. The final total eligible sample was 2,203 women at baseline, 1,121 at the four-month follow-up, and 1,613 at the twelve-month follow-up (see Figure 2).

7.3.2 Key measures

Intimate partner violence (IPV) was assessed on surveys using one item for physical IPV[110] and two items for sexual IPV (with and without the use of force)[111] modified for the parent study.[109] Reproductive coercion (RC) was reported on surveys using ten items developed for use in young female populations[7]; example items are "tried to force or pressure you to become pregnant" and "taken off the condom while you were having sex, so you would get pregnant." For both the IPV and RC items, answering yes to one or more items was coded as positive for IPV or RC, respectively. Recent (past three month) IPV and RC were assessed at baseline, four-mouth follow-up, and twelve-month follow-up; lifetime IPV was collected at baseline only.

Past-year pregnancy was reported on the baseline and the twelve-month follow-up surveys. At baseline, the item was “How many times have you been pregnant in the past 12 months?” This question was modified for the twelve-month follow-up to “How many times have you been pregnant in the past 12 months – including miscarriages and abortions?” At both timepoints, response options were “I have not been pregnant in the past 12 months,” “once,” and “twice or more.” Pregnancy intention was assessed on the baseline survey by asking “are you planning on becoming pregnant in the next 12 months?” (5 point Likert scale of definitely no to definitely yes) and “How much do you agree with the following statement: I would like to get pregnant in the next year” (5 point Likert scale of strongly agree to strongly disagree). Those who reported planning to become pregnant (definitely yes or yes) or that they would like to get pregnant (strongly agree or agree) in the next year were coded as being positive for pregnancy intention.

Sexually transmitted infections (STI) were reported using a single item on surveys at baseline, four-month follow-up, and twelve-month follow-up. At baseline, the item was “Have you ever been told by a doctor or other health care professional that you had an STD? By STD we mean, for example, chlamydia, gonorrhea (also known as the clap), syphilis, herpes, genital warts, Hepatitis B, or HIV?” Response options were “no, never,” “yes, but not in the past 3 months,” and “yes, in the past 3 months.” On the four-month and twelve-month surveys, the item was modified to specify, “In the past 3 months, have you been told...” instead of “Have you ever been told…” Response options for these timepoints were “no, not in the past 3 months” and “yes, in the past 3 months.” Endorsements of “yes, in the past 3 months” were coded as positive for recent STI diagnosis. Endorsement of “yes, but not in the past 3 months” at baseline was coded as positive for lifetime STI diagnosis.

Medical record data were abstracted by research staff into a structured database created by the investigators. For every visit in the medical record, research staff were prompted to report reasons for visit and pregnancy and STI testing and diagnosis. Current pregnancy was identified if one of the following criteria were met: 1) reason for visit was prenatal care or abortion; 2) pregnancy test was not taken because patient is currently pregnancy; or 3) outcome of pregnancy test was positive. Medical record data on pregnancy in the year prior to study enrollment matched the referent time period at baseline for pregnancy (past-year); pregnancy diagnoses were censored at the twelve-month survey to match that survey time period (past-year).

For every visit abstracted, research assistants noted if there was an STI test done, whether an STI was diagnosed, and if so, which STI. A diagnosis of STI was coded as positive for STI diagnosis regardless of which STI was identified. To match the referent time periods of the surveys, recent IPV, RC, and STI were only counted in the medical record if the visit was within the three months prior to a survey but excluding the date of survey. This method was chosen because the participants took surveys prior to clinical visits and thus would not know their medical status (i.e., if an STI was diagnosed that day, the woman would not know at the time of the survey).

7.3.3 Analysis

Descriptive characteristics were obtained from the baseline surveys and reported. STI and pregnancy incidence were reported for each time point (baseline, four-month follow-up, and twelve-month follow-up, excluding past-year pregnancy at the four-month follow-up). Cohen's kappa statistic for measuring agreement was calculated for each time point as well as pooled across all time points (accounting for clinic-level clustering).

The agreement between self-report and medical record data was categorized for each health outcome as 1) no by self-report / not in medical record; 2) no by self-report / yes in medical record; 3) yes by self-report / not in medical record; and 4) yes by self-report / yes in medical record. To determine predictors of discordance for recent STI and past-year pregnancy, categorization was reported by variables of interest. Multinomial mixed models were used with the "concordant no" group serving as the reference category. Variables that were tested as predictors were age cohort (adolescent versus young adult), race/ethnicity, IPV, RC, and, for past-year pregnancy, pregnancy intention at baseline. All predictors were identified from the self-reported surveys. Models adjusted for age, race/ethnicity (where appropriate), intervention arm, and accounted for within-clinic clustering. SAS v9.4[96] was used for analyses and significance was set at α=0.05.

7.4 RESULTS

In this sample, 38.4% of the women were 16-19 years of age and 61.6% were 20-24 years of age; they were primarily non-Hispanic White (79.2%) (Table 13). One in four (23.4%) women had not completed a high school degree at the time of the baseline survey and one of every three women was single (31.5%).

STI and pregnancy prevalence were both higher with self-report compared to medical record data (Table 14). Past 3 month STI were self-reported by 3.6-6.3% of participants across the three surveys while medical records indicated recent diagnoses in 1.2-2.0% of participants. Between baseline and T3 surveys, past year pregnancies were self-reported by 14.0-16.5% of participants and recorded in chart data for 6.6%-9.3% of participants.

The vast majority of observations (up to three per person) (94.6%) did not have an STI report via self-report or through the medical record data, with the remaining having an STI identified through at least one source. Of those occasions with at least one report of an STI (self-report, medical record, or both; n=274 observations), two-thirds (68.6%) had self-reported STI that was not identified in the medical records. The remaining observations were identified as having an STI in both self-report and medical records (21.9%) or medical records but not self-report (9.5%). Kappa statistics for the agreement between self-report and medical record data were similar across timepoints and had an overall agreement of K=0.343.

Most observations (up to two per person) (84.0%) did not have a pregnancy recorded through self-report or medical records (Figure 1). Of those occasions with at least one pregnancy report (n=612 observations) 51.8% had pregnancy reports through self-report only and 42.0% had pregnancy reports through both self-report and medical records. The remaining observations (6.2%) had pregnancy reporting through medical records only. The Kappa statistics for the agreement between self-report and medical record data were similar between baseline and the twelve-month follow-up, with an overall agreement of K=0.545.

A greater proportion of African-American women had discordant reporting of STI and pregnancy for both no by self-report / yes in medical record and yes by self-report / no in medical record, compared to their White and Multiracial/Other peers (Table 15). More women who experienced IPV or RC self-reported pregnancy that both were and were not documented in their medical records compared to women who did not experience IPV or RC, respectively. Experiencing RC was also associated with greater self-reporting of STI compared to women who did experience RC. Compared to adolescents, more young adult women self-reported

pregnancies that were not identified in their medical records. Conversely, more adolescents than young adults self-reported pregnancies that were substantiated in their medical records.

Women who intended pregnancy at baseline were more likely to self-report pregnancies that were not found in the medical records at follow-up compared to women who did not intend pregnancy at baseline.

Multinomial models were used to determine significant predictors of discordance after adjusting for age cohort, race/ethnicity, and intervention status (Table 16). Black women had higher odds of discrepant reporting for STI in both directions (AOR=5.68, 95% CI 2.82-11.4 for no by self-report / yes in medical record and AOR=3.01 [2.01-4.50] for yes by self-report / not in medical record). Reporting STI that were not in the medical records was also associated with recent IPV (AOR=1.82 [1.16-2.87]) and RC (AOR=2.82[1.74-4.59]). Similar results were found for pregnancy reporting. African-American women had higher odds of self-reporting STI that were not in their medical records compared to White women (AOR=1.84 [1.22-2.77]). Recent IPV (AOR=1.85 [1.39-2.46]) and recent RC (AOR=2.22 [1.57-3.13]) were also associated with higher odds of being categorized as yes by self-report / not in medical records. Women who reported at baseline that they were intending to become pregnant in the next year had higher odds of reporting a pregnancy that was not in the medical records (AOR=2.10 [1.37-3.21]).

7.5 DISCUSSION

This study demonstrates that partner violence – specifically intimate partner violence and reproductive coercion – is associated with discrepant reporting of sexual health outcomes among adolescent and young adult women attending family planning clinics when comparing their self-

report of these indicators on a survey to their medical records. In this particular population, more cases of STI and pregnancy were identified through participants answering confidential surveys compared to data that were abstracted from the participants' medical records. In general, agreement between these two data sources was poor.

The reporting patterns found in this study are a stark contrast to most prior work. In one study, 4% of participants reported STI diagnoses in the absence of medical record documentation, while 40% of participants reported no STI despite the diagnosis in their medical records.[76] Similarly, another study found accurate self-reporting in almost all (98.5-99.8%) of negative tests, but much lower accuracy for positive test results (56.5-74.6%).[75] In contrast, however, it a study of pregnant women that found that recent and lifetime histories of STI diagnosis were significantly more likely to be identified via personal interviews compared to medical record data.[155] In general, however, sexual behaviors that are socially sensitive (e.g., age at first sex, transactional sex) or socially rewarded (e.g., consistent condom use) – are more likely to be reported differentially by data collection instrument.[156-158]

As the age range is similar to the other studies, it remains unclear why this study has the opposite pattern to most of the research to date. It is possible that the strong study design in this current project, which utilized confidential, self-administered surveys on three separate occasions (thus limiting the recall period), facilitated better self-reporting compared to previous studies. In fact, reviews of the methodological challenges and validity of self-reported risk behaviors have stressed the importance of using short recall periods to facilitate more accurate reporting.[159,160] Furthermore, studies have found significant differences in the information self-reported based on the method by which the survey is conducted, such as interviewer-administered, self-administered ("paper-and-pencil" surveys), or computer administered (with or without the use of

audio recordings of the questions)[156,159] and self-reports over time.[77,78] For example, socially sensitive questions such as initiation of sex, STI history, same-sex contact, are more likely to be reported on self- or computer-administered surveys compared to an interviewer.[156-159]

Adolescents (16-19 years) in the present study were less likely to have discordant reporting compared to young adults (20-24 years), specifically for self-reporting an STI that was not confirmed in the medical record. While previous work has indicated that younger age is associated with inconsistent self-reporting over multiple time points,[77,142,143] the present discrepancy may be due to using family planning clinic patients for the current study. It is possible that the older women had greater access to alternative healthcare providers compared to the adolescents, and thus were less likely to have the diagnosed STI documented in their medical records.

A second demographic factor that was associated with discordant reporting was race. In particular, not only did African-American women have the highest prevalence of recent STI across the two reporting modalities, as is consistent with national estimates,[140] they also had significantly (and dramatically) higher odds of discordance in that STI reporting. This is consistent with prior work that indicates African-American females report sexual behaviors less consistently over time compared to their White peers.[142,143] However, the research to date does not explain the mechanisms by which these greater discordances occur. Women who reported an STI that was not substantiated in the medical record data may be due to their reporting gynecological conditions that are not actually STI, such as bacterial vaginosis. Bacterial vaginosis is more prevalent among African-American women[161-163]; incorrectly endorsing this as an STI may explain why African-American women had higher odds of self-reporting an STI that was not in the medical record, compared to White women. Additionally, African-American

women in this study were more likely to report that they received care in an emergency department in the past year during the twelve-month follow-up survey and less likely to have a primary care physician (data not shown); any STI diagnosed in the emergency department or other walk-in clinic would not have been entered into the patient's medical record at the family planning clinic. However, this does not explain the increased odds of not self-reporting an STI that was documented in the medical record data. One possibility is that providing socially desirable information varied by race in this study (as it varied by age in a previous study9), but that is beyond the scope of the current data.

Partner violence and reproductive coercion were also associated with discordant reporting. Women who experienced recent IPV or RC were significantly more likely to self-report STI and pregnancies that were not documented in the medical records. Studies on partner influence of care seeking behaviors in the context of IPV/RC suggest that partners may interfere with getting consistent and required care.[8] Therefore, it is possible that women are seeking care in other health settings and thus the STI and pregnancies are not captured in the family planning clinic data. This is supported in the present study, as women who self-reported recent IPV or RC at the twelve-month follow-up survey were more likely to report going to a primary care physician and emergency room for care in the past year (data not shown). Additionally, as abortions are also more prevalent among women experiencing abuse,[164] it may be that, at least for pregnancy, that they are using home pregnancy tests and seeking pregnancy termination services elsewhere. Given this, research studies that rely on medical record data from a single healthcare center would underestimate the associations between IPV/RC and STI/pregnancy. However, it should be noted that the present study relied upon self-report only for IPV and RC,

as these data were too scarce in the medical records (<1%). Medical records with more complete information on partner violence may lead to different conclusions.

This study has several strengths to note. The longitudinal design allowed for survey data collection at three different times over a one year span; using the survey dates, we were able to restrict the medical record data to the periods of interest (past three months for STI, past year for pregnancy). This is especially important as a previous study found that among adolescent and young men that have ever self-reported an STI, the vast majority (94-98%) later denied any history of STI.[78] Therefore, our longitudinal design allowed us to limit the likelihood of recall bias. The use of self-administered surveys on a computer allowed for participants to answer questions privately instead of directly to a person; this decreases the chances of social desirability bias in reporting STI and pregnancies. The vast majority of participants (97%) signed waivers for the research team to abstract medical record information, thus selection bias based on willingness to have the medical record reviewed is limited in this study.

There are also several limitations. This present analysis excluded women who did not have sex with men or were not sexually active in the past three months, due to the survey design. Our conclusions are therefore not necessarily generalizable to sexual minority women or women who have not recently had sex. There were two main organizations that operated the family planning clinics, and the medical waivers participants signed were specific to the larger organization running the clinic where they received care. Thus, women who moved from one family planning agency to the other or into private care would have incomplete medical record information for the purposes of this study. The parent study was a randomized controlled trial to test the effectiveness of a provider-delivered intervention to reduce the impacts of IPV and RC; while intervention status was controlled for in the multinomial models and was not a significant

predictor of STI or pregnancy category in models adjusted for age cohort and race/ethnicity (STI model, p=0.38 and pregnancy model, p=0.45), we cannot rule out residual confounding.

Given the higher prevalence of STI and pregnancy found with self-report compared to medical record data, it may be advantageous to focus research efforts on optimizing study survey design, such as by more frequent follow-up assessments to allow for shorter time periods of recall, instead of abstracting medical record data. In this study, the abstracted data identified ≤1% of STI and pregnancy cases that were not reported by participants on the surveys; thus, the value of this additional data abstraction step is negligible. This study assessed predictors of discordant reporting of sexual health outcomes among adolescent and young adult women patients of family planning clinics, with race and partner violence emerging as important determinants. Research on adolescent and young adult sexual health, which already has an increasing focus on the importance of race and partner factors, should consider these findings in determining best study designs, data collection methods, and outcome ascertainment.

7.6 TABLES AND FIGURES

Table 13. Participant characteristics self-reported at baseline

Characteristic	Total (n =2,203) % (n)[a]
Age	
16-17 years	13.6 (300)
18-19 years	24.8 (547)
20-22 years	41.4 (911)
23-24 years	20.2 (445)
Race/ethnicity	
Black/African-American	14.1 (310)
White	79.2 (1,745)
Multiracial or Other	6.2 (137)
Highest education level completed	
Less than high school degree	23.4 (515)
High school degree / GED	28.6 (629)
Some college	34.6 (763)
Finished college or graduate school	12.9 (285)
Relationship status	
Single/dating more than one person	31.5 (693)
Dating one person/In a serious relationship	63.4 (1,396)
Married	4.3 (94)

[a] Percentages may not sum to 100 due to small amounts of missing date and rounding

Table 14. STI and pregnancy prevalence by data source and time point

Outcome	Baseline		Four-month follow-up		Twelve-month follow-up		Any event across all timepoints	
	Self-report	Medical record	Self-report	Medical record	Self-report	Medical record	Self-report	Medical record
	n=2,203	*n=2,203*	*n=1,212*	*n=1,212*	*n=1,613*	*n=1,613*	*n=5,028*	*n=5,028*
Recent STI, % (n)	5.2 (114)	2.0 (43)	6.3 (76)	1.9 (23)	3.6 (58)	1.2 (20)	4.9 (248)	1.7 (86)
	n=2,203	*n=2,203*			*n=1,613*	*n=1,613*	*n=3,816*	*n=3,816*
Past-year pregnancy, % (n)	14.0 (308)	6.6 (145)	---	---	16.5 (266)	9.3 (150)	15.0 (574)	7.7 (295)

Table 15. Associations with discordant reporting

	No by self-report		Yes by self-report	
	Not in medical record % (n)[a]	Yes in medical record % (n)[a]	Not in medical record % (n)[a]	Yes in medical record % (n)[a]
Recent STI				
Sample size	*n=4754*[b]	*n=26*[b]	*n=188*[b]	*n=60*[b]
Total	94.6 (4754)	0.5 (26)	3.7 (188)	1.2 (60)
Cohen's K (95% CI)[c]				*0.343 (0.246-0.439)*
Age group				
Adolescents (16-19 years)	94.1 (1837)	0.8 (15)	3.6 (70)	1.6 (31)
Young adults (20-24 years)	94.9 (2917)	0.4 (11)	3.8 (118)	0.9 (29)
χ^2 p-value[d]				0.185
Race/ethnicity				
White	95.8 (3838)	0.3 (13)	2.9 (116)	1.0 (41)
Black/African-American	88.4 (625)	1.7 (12)	8.4 (59)	1.6 (11)
Multiracial or Other	93.0 (291)	0.3 (1)	4.2 (13)	2.6 (8)
χ^2 p-value[d]				**0.003**
Intimate partner violence				
Yes	91.1 (0.6)	0.6 (3)	6.1 (32)	2.3 (12)
No	95.0 (4274)	0.5 (23)	3.5 (156)	1.1 (48)
χ^2 p-value[d]				0.105
Reproductive coercion				
Yes	85.5 (200)	0 (0)	10.7 (25)	3.9 (9)
No	95.0 (4554)	0.5 (26)	3.4 (163)	1.1 (51)
Fisher exact p-value[e]				**<.0001**
Past-year pregnancy				
Sample size	*n=3204*[f]	*n=38*[f]	*n=317*[f]	*n=257*[f]
Total	84.0 (3204)	1.0 (38)	8.3 (317)	6.7 (257)
Cohen's K (95% CI)[c]				*0.545 (0.417-0.674)*
Age group				
Adolescents (16-19 years)	85.9 (1256)	1.3 (19)	6.4 (94)	6.4 (94)
Young adults (20-24 years)	82.8 (1948)	0.8 (19)	9.5 (223)	6.9 (163)
χ^2 p-value[d]				**0.027**
Race/ethnicity				
White	85.3 (2617)	1.0 (29)	7.2 (220)	6.6 (201)

Table 15 Continued

Black/African-American	75.9 (388)	1.6 (8)	13.9 (71)	8.6 (44)
Multiracial or Other	83.6 (199)	0.4 (1)	10.9 (26)	5.0 (12)
χ^2 p-value[d]				0.153
Intimate partner violence				
Yes	81.2 (315)	1.3 (5)	13.1 (51)	4.4 (17)
No	84.3 (2889)	1.0 (33)	7.8 (266)	7.0 (240)
χ^2 p-value[d]				**0.004**
Reproductive coercion				
Yes	73.1 (136)	0.5 (1)	17.7 (33)	8.6 (16)
No	84.5 (3068)	1.0 (37)	7.8 (284)	6.6 (241)
χ^2 p-value[d]				**<.001**
	n=1,205[5]	*n=14*[5]	*n=127*[5]	*n=130*[5]
Pregnancy intention				
Intended	68.4 (39)	0 (0)	19.3 (11)	12.3 (7)
Not intended	82.2 (1,166)	1.0 (14)	8.2 (116)	8.7 (123)
Fisher exact p-value[e]				**0.026**

[a] Row percent

[b] Sample size is based on 2,203 unique baseline participants with up to two (pregnancy) or three (STI) total observations

[c] K statistic did not significantly vary by timepoint so is presented as a pooled value, accounting for clinic-level clustering

[d] P-value calculated using a Wald log-linear χ^2 test for overall difference between predictor and STI/pregnancy reporting group and accounting for within-clinic clustering

[e] P-value calculated using a Fisher's exact test (due to small cell size) to test for overall difference between predictor and STI/pregnancy reporting group

[f] Sample size is based on 1,476 participants who completed baseline pregnancy intention items and the T3 survey

Table 16. Multinomial logistic regression models to test the association between proposed predictors and STI / pregnancy reporting status

Predictors of discordant reporting	No by self-report / yes in medical record AOR (95% CI)[a]	Yes by self-report / not in medical record AOR (95% CI)[a]	Yes by self-report / yes in medical record AOR (95% CI)[1]
		Recent STI	
Age cohort[b]			
Adolescents (16-19 years)	1.86 (0.81-4.31)	0.91 (0.67-1.23)	1.64 (0.98-2.75)
Young adults (20-24 years)	-Reference Group-	-Reference Group-	-Reference Group-
Race/ethnicity[c]			
White	-Reference Group-	-Reference Group-	-Reference Group-
Black/African American	**5.68 (2.82-11.4)**	**3.01 (2.01-4.50)**	1.61 (0.89-2.90)
Multiracial or Other	0.93 (0.19-4.58)	1.49 (0.80-2.77)	2.49 (0.94-6.55)
Intimate partner violence[d]			
Yes	1.01 (0.38-2.70)	**1.82 (1.16-2.87)**	2.01 (0.90-4.47)
No	-Reference Group-	-Reference Group-	-Reference Group-
Reproductive coercion[d]			
Yes	N/A	**2.82 (1.74-4.59)**	**3.46 (1.69-7.08)**
No	-Reference Group-	-Reference Group-	-Reference Group-
		Past-year pregnancy	
Age cohort[b]			
Adolescents (16-19 years)	1.59 (0.81-3.12)	**0.63 (0.50-0.80)**	1.00 (0.80-1.25)
Young adults (20-24 years)	-Reference Group-	-Reference Group-	-Reference Group-
Race/ethnicity[c]			
White	-Reference Group-	-Reference Group-	-Reference Group-
Black/African American	1.22 (0.50-3.01)	**1.84 (1.22-2.77)**	0.93 (0.49-1.79)
Multiracial or Other	0.36 (0.05-2.47)	1.57 (0.89-2.79)	0.65 (0.37-1.15)
Intimate partner violence[d]			
Yes	1.27 (0.63-2.56)	**1.85 (1.39-2.46)**	0.69 (0.39-1.21)

Table 16 Continued

No	-Reference Group-	-Reference Group-	-Reference Group-
Reproductive coercion[d]			
Yes	0.50 (0.12-2.04)	**2.22 (1.57-3.13)**	1.43 (0.74-2.78)
No	-Reference Group-	-Reference Group-	-Reference Group-
Next-year pregnancy intention			
Intended	**N/A**	**2.10 (1.37-3.21)**	1.17 (0.50-2.76)
Not intended	-Reference Group-	-Reference Group-	-Reference Group-

[a] Reference group is no by self-report / not in medical record

[b] Model adjusted for race/ethnicity and intervention status

[c] Model adjusted for age cohort and intervention status

[d] Model adjusted for age cohort, race/ethnicity, and intervention status

N/A: not applicable, as category had no responses or too few responses to estimate effects

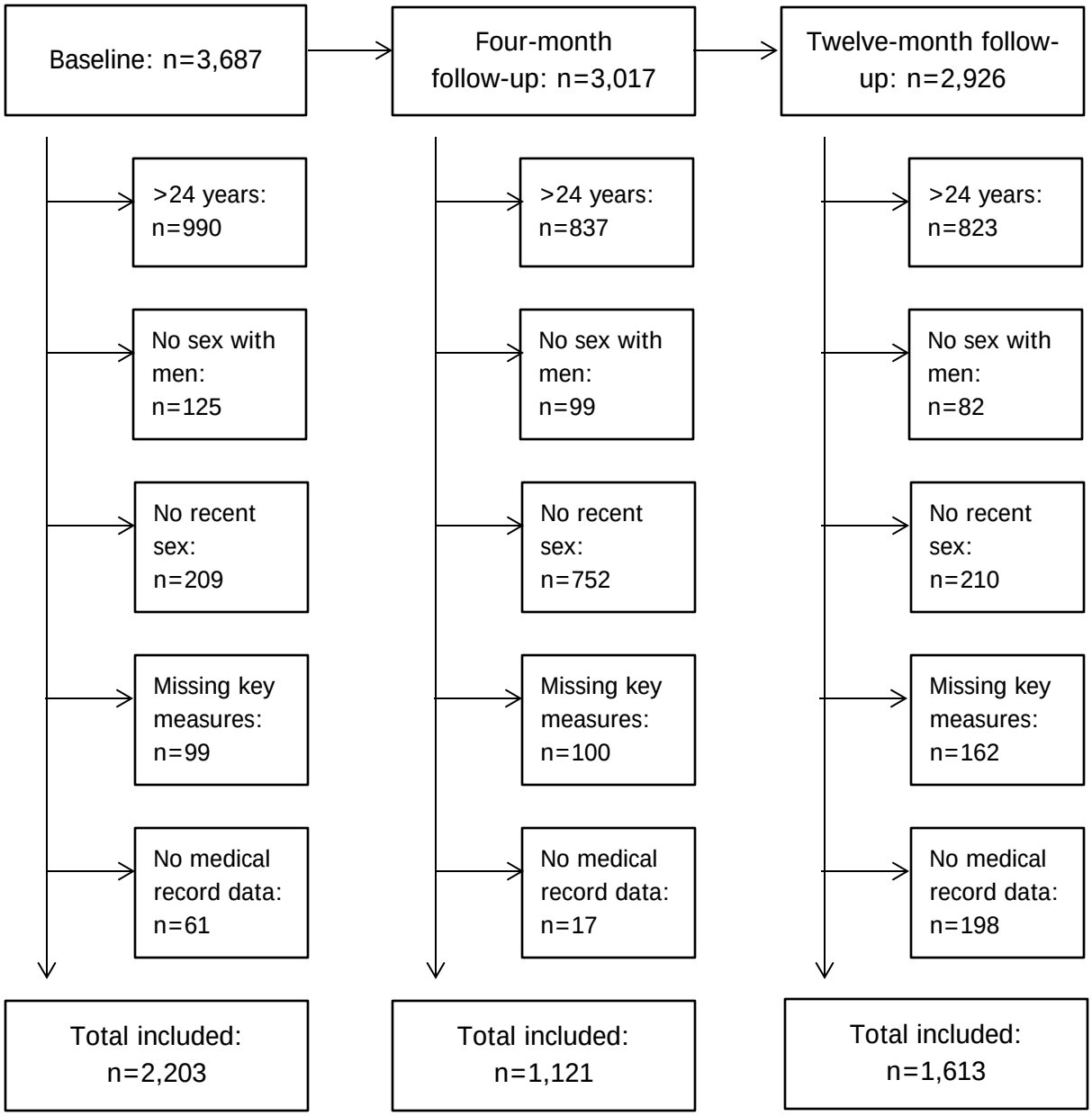

Figure 2. Study flow diagram for analytic sample

8. SYNTHESIS

8.1 OVERVIEW OF RESEARCH FINDINGS

This dissertation used data from a clinical trial conducted among family planning clinic patients as well as nationally representative survey data to study the relationship between partner influence, including intimate partner violence and reproductive coercion, on adolescent and young adult women's reproductive and sexual health.

Aim 1 assessed condom negotiation self-efficacy as a mediator in the relationship between IPV/RC and unintended pregnancy/STI. Given the high rates of poor sexual health outcomes among women experiencing IPV, identifying a key mechanism on this pathway has the potential to impact a large portion of the female population. We found that recent experiences of IPV or RC were associated with decreased condom negotiation self-efficacy, increased unintended pregnancy, and increased STI. However, the impact of IPV and RC on condom negotiation self-efficacy largely did not mediate the relationships between IPV/RC and unintended pregnancy/STI. Thus, while sexual self-efficacy is modifiable through intervention,[94-96] this focus alone would not be sufficient to reduce unintended pregnancy or STI incidence. Programs should go beyond increasing condom negotiation skills of adolescent and young adult women.

Aim 2 assessed adolescent and young adult women's use of female-controlled contraceptives (FCC) and male partners' influence on use of these methods. FCC (including oral

contraception, intrauterine devices, implants, injectables, patches, and rings) are more effective at preventing pregnancy than condoms alone or other methods such as withdrawal or rhythm planning.[116] While there are varying degrees of a woman's control for the various FCC methods, they can be used without a male partner's knowledge or cooperation if needed or desired. We found that roughly half of women 15-24 years are using an FCC method, but the majority of these are oral contraception users. Use of longer acting reversible contraceptives, which are extremely effective at preventing pregnancy[116] are used by only a small minority of young women.

Male partner influence, defined in Aim 2 as a partner influencing past contraception termination, was associated with greater current use of FCC (young adult women only) and past-year number of FCC methods (adolescent and young adults). This may indicate that women, especially those who are past adolescence, who have experienced this influence cope by trying various methods that offer them greater reproductive autonomy. Adolescents who experienced partner influence had lower current FCC use and more months of FCC nonuse. Adolescents, regardless of partner influence, reported more FCC methods and discontinuing more FCC methods in the past year compared to young adult women. Public health practitioners and clinicians should address contraceptive method choice and use in the context of partner influence. For example, by specifically talking to women about partner influences and addressing barriers that women face including partners' interference and influence over contraceptive decision making, discussions around contraceptive choice can better support women's autonomy, focus on methods that partners are least likely to interfere with, and provide women with a range of options. Adolescents in particular appear to need more assistance with coping to partner influence and finding contraception that is right for them. It is important to note here that male

partner influence did not include intimate partner violence or reproductive coercion, but rather more subtle behaviors. Thus, practitioners should be aware that contraceptive use among women who do not experience partner violence may also be impacted by past and current partners in a less overt (but still influential) manner.

A secondary finding from this study (Aim 2) was that minority women have less optimal use of contraception compared to White women in the U.S. This is consistent with previous research of racial and ethnic differences in reproductive and sexual health. Further, differential healthcare access, utilization,[137] knowledge, and attitudes,[138] by race and ethnicity do not account for these disparities in previous work. Thus, there should be a continued push to ensure equitable contraceptive coverage with the ultimate goal being to end racial and ethnic disparities in unintended pregnancies[34] and STI acquisition.[165]

Aim 3 assessed the concordance between self-report and medical record data for pregnancies and STI to identify best practices for sexual health research, specifically in the context of partner violence. Young women who self-reported IPV or RC had significantly higher odds of self-reporting on a confidential survey a diagnosis of recent STI or past-year pregnancy compared to women who did not experience partner violence. Thus, relying on medical record data solely for sexual health outcomes in this study would have differentially underestimated the prevalence of STI and pregnancy among the abused women. Given that IPV and RC have been associated with STI (IPV only) and unintended pregnancies, studies that rely on the medical record data may have been underestimating even stronger associations than normally observed. This highlights the crucial need programs that help to alleviate the public health burden of these problems at multiple levels: first for partner violence, before it begins, identifying it earlier, and aiding with harm reduction strategies to minimize harmful consequences, and second, for STI

and unintended pregnancy, by educating adolescents on healthy relationships and ways to protect themselves (e.g., condoms, longer acting reversible contraception).

It should be noted that in the medical record data of these family planning clinic patients, IPV and RC disclosure were rare (<10 cases in the eligible sample and time periods for Aim 3), precluding the comparison of this data to self-report and for the use of predicting concordance. This study is therefore limited by using only data self-reported by participants on surveys to assess concordance of data collected both by self-report on surveys and documentation in the medical record.

Overall, taken together, these three studies aimed to determine key factors in the pathways, patterns, and assessment of negative male partner influences on young women's reproductive/sexual health and contraceptive use. This project demonstrated that adolescent and young adult women, who are at different developmental stages of their lives, are too dissimilar to assess as one larger group; in particular, partner violence and other sources of partner influence appear to differentially impact their sexual and reproductive health. Additionally, what was assessed at presumably more "subtle" levels of partner influence appeared to be related to young women's recent contraceptive use. Studies that are longitudinal, utilize self-report on confidential surveys to ensure privacy, and limit recall periods appear to provide higher prevalence estimates for STI and pregnancy.

8.2 STRENGTHS AND LIMITATIONS OF THIS RESEARCH

There are a number of considerable strengths in this research. Aims 1 and 3 were addressed using longitudinal data, with three survey time points and up to 30 months of medical record

data. This allowed for key measures, including IPV, RC, STI, and unintended pregnancy to be assessed multiple times, and where appropriate, be time-varying in models. The relatively high-risk population (family planning clinic patients) used for Aims 1 and 3 was balanced by using a nationally representative sample for Aim 2. This provided a more nuanced and complete view of how males can influence their female partners. The ARCHES study (Aims 1 and 3) was conducted in a primarily rural setting, adding to the literature that is predominantly urban-based studies. Finally, Aim 2 was addressed using extensive data on contraceptive use, providing a month-by-month picture of how women in the U.S. are using contraception over a one-year period.

There are limitations to this research that should be noted. While the rural setting indicated in the ARCHES study is a strength, it does mean that the findings in Aims 1 and 3 may not generalize to other more urban and racially diverse populations. Contraceptive data used in Aim 2 was self-reported at one time point and not verified with outside sources (e.g., medical records, prescriptions). In addition, the partner influence determinants identified in Aim 2 were not asked of each person, but rather were contingent on certain conditions (e.g., a woman was only asked about her partner's pregnancy intentions if they were married or living together).

8.3 PUBLIC HEALTH SIGNIFICANCE

Intimate partner violence (IPV) and reproductive coercion (RC) are serious, high-burden public health problems. In the U.S., it is estimated that 7 million women are victims of IPV each year and over 10 million women experience partners' attempts to control their reproductive choices in

their lifetimes.[4] These experiences are associated with unintended pregnancy, STI, and other poor reproductive and sexual health outcomes.

In 2008, almost 3.4 million pregnancies in the United States were unintended, representing half (51%) of all pregnancies; 15-19 and 20-24 year olds contributed 612,000 and 1.1 million unintended pregnancies, respectively, to this count.[34] Over one million reported cases of chlamydia occurred among individuals younger than 25 years of age in 2012 alone and women 15-24 years made up 35% of all cases of gonorrhea reported.[99] Chlamydia and gonorrhea have been associated with one-third to one-half of all cases of pelvic inflammatory disease, which in turn is associated with long-term reproductive consequences, including infertility, chronic pelvic pain, and ectopic pregnancy.[46] Thus, IPV, unintended pregnancies, and STI represent substantial, overlapping problems that have a profound impact on the health of adolescents and young adults. Innovative strategies to address this nexus of public health problems are needed.

Findings from this dissertation can help to inform these desperately needed strategies to protect the health of these young women, establishing the public health significance of this work. Increasing self-efficacy (a common goal of sexual health interventions) is not sufficient for reducing the impact of partner violence of reproductive health outcomes and that many young women have already experienced STI and unintended pregnancy prior to introduction to such programs. Thus, not only should translational work identify a wider range of skills to address (e.g., condom use skills may be helpful beyond the self-efficacy to request condom usage), but it should also target women prior to these first adverse health outcomes, ideally before sexual debut. Additionally, a substantial proportion of sexually active women in the U.S. are not using adequate contraception, which is partially related to partner influence. At the population level, it

is crucial to increase use of highly effective contraception – particularly longer-acting reversible contraceptives. Finally, study design concerns were identified for public health research, which will help to improve the conduct of future research.

8.4 DIRECTIONS FOR FUTURE RESEARCH

This dissertation has opened up several promising avenues for future research. While recent IPV/RC and condom negotiation self-efficacy were associated with unintended pregnancy and STI, effects were relatively small when compared to the effects of previous experiences of STI and unintended pregnancies. Therefore, future research should focus on targeting younger adolescents who have not yet had these sexual health outcomes; ideally, interventions would occur prior to the adolescents initiating sex. Additionally, as we know that experiencing partner violence is associated with lower sexual self-efficacy, as shown in Aim 1, and that self-efficacy is modifiable,[94-96] specific strategies to increase sexual self-efficacy and condom negotiation skills among women experiencing abuse should be explored. Future research should also identify the barriers to contraceptive use among women who have never used female-controlled contraception (versus consistent or intermittent users), as Aim 2 demonstrated that a substantial proportion of adolescent and young adult women had not used any female-controlled contraception in the past year. Additionally, the findings suggested that adolescents are particularly less adept at coping with partner influence compared to young adult women, and thus harm reductions strategies should be specifically identified and tailored to these girls.

Finally, Aim 3 identified shortcomings specifically for research methodology. Findings indicate that study design is crucial, given the sensitive nature of this research. Studies on

partner violence and sexual health should consider using longitudinal designs, have participants self-report on confidential, computer-administered surveys for greatest privacy, and have short recall periods. With this design, it appears that medical record data, at least when limited to one healthcare organization (such as a family planning clinic system), does not contribute meaningfully to prevalence estimates (≤1%) and rarely provided information on IPV and RC disclosures. Further, as women who are higher risk for STI and pregnancy also were significantly more likely to self-report STI and pregnancies that were not found in the medical record data (women experiencing IPV or RC, older, or African-American), medical record data alone would differentially underestimate their true disease burden. Thus, greater equity in research may be achieved through optimizing conditions for accurate self-reporting.

APPENDIX: KEY MEASURES FROM THE ADDRESSING REPRODUCTIVE COERCION IN HEALTH SETTINGS STUDY

Table 17. Survey items from the ARCHES study

		Survey		
	Response Options	**Baseline**	**T2**	**T3**
Intimate Partner Violence: "In the past three months…"				
… have you been hit, pushed, slapped, choked, or otherwise physically hurt by someone you were dating or going out with?	Yes / No	X	X	X
… has someone you were dating or going out with used force or threats to make you have sex (vaginal, oral, or anal sex) when you didn't want to?	Yes / No	X	X	X
… has someone you were dating or going out with made you have sex (vaginal, oral, or anal sex) when you didn't want to, but didn't use force or threats?	Yes / No	X	X	X
Reproductive Coercion: "In the past three months, has someone you were dating or going out with…"				
…tried to force or pressure you to become pregnant?	Yes / No	X	X	X
…told you not to use any birth control (like the pill, shot, ring, etc)?	Yes / No	X	X	X
…said he would leave you if you didn't get pregnant?	Yes / No	X	X	X
…told you he would have a baby with someone else if you didn't get pregnant?	Yes / No	X	X	X
…taken off the condom while you were having sex, so you would get pregnant?	Yes / No	X	X	X
…put holes in the condom so you would get pregnant?	Yes / No	X	X	X
…broken the condom on purpose while you were having sex so you would get pregnant?	Yes / No	X	X	X
…taken your birth control (like pills) away from you or kept you from going to the clinic to get birth control?	Yes / No	X	X	X

Table 17 Continued

…made you have sex without a condom so you would get pregnant?	Yes / No	X	X	X
…hurt you physically because you did not agree to get pregnant?	Yes / No	X	X	X
Condom Negotiation Self-Efficacy				
I feel confident in my ability to discuss condom use with any partner I might have.	5 point Likert scale, Strongly agree to Strongly disagree	X	X	X
I feel confident in my ability to suggest using condoms with a new partner.	5 point Likert scale, Strongly agree to Strongly disagree	X	X	X
If I were to ask my partner to use a condom, I would be afraid that my partner would be upset with me.	5 point Likert scale, Strongly agree to Strongly disagree	X	X	X
If I were unsure of my partner's feelings about using condoms, I would not ask my partner to use one.	5 point Likert scale, Strongly agree to Strongly disagree	X	X	X
If my partner didn't want to use a condom during sex, I feel confident in my ability to refuse to have sex.	5 point Likert scale, Strongly agree to Strongly disagree	X	X	X
STI History				
Have you ever been told by a doctor or other health care professional that you had an STD? By STD we mean, for example, Chlamydia, honorrhea (also known as the clap), syphillis, herpes, genital warts, Hepatitis B, or HIV?	No, never Yes, but not in the past 3 months Yes, in the past 3 months	X		
In the past 3 months, have you been told by a doctor or other health care professional that you had an STD? By STD we mean, for example, Chlamydia, gonorrhea (also known as the clap), syphilis, herpes, genital warts, Hepatitis B, or HIV?	No, not in the past 3 months Yes, in the past 3 months		X	X
Pregnancy History				
How many times have you been pregnant when you didn't want to be?	None, this has never happened to me Once Twice or more	X		

Table 17 Continued

How many times have you been pregnant in the past 12 months?	I have not been pregnant in the past 12 months Once Twice or more	X	X
Would you say this most recent pregnancy came too soon, at the right time, or later than you wanted?	Too soon Right time Later than I wanted		X
Right before you became pregnant most recently, did you plan to get pregnant?	Yes / No		X
In the month before this most recent pregnancy, would you say that you wanted to have a baby with your partner at the time?	Yes / No		X
If you had to rate from 0 to 4 how much you wanted or did not want a pregnancy right before this most recent pregnancy, how would you have rated yourself?	5 point Likert scale, Wanted to avoid to wanted to get pregnant		X
Right before you became pregnant with your most recent pregnancy, how much were you trying to get pregnant?	5 point Likert scale, Trying not to get pregnant to really trying hard to get pregnant		X
Right before you became pregnant with your most recent pregnancy, how much were you trying to avoid getting pregnant?	5 point Likert scale, Not trying to avoid to trying to avoid		X
How happy did you feel when you found out you were pregnant?	5 point Likert scale, Very unhappy to very happy		X

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